AD-A066 111 NATIONAL ACADEMY OF SCIENCES WASHINGTON DC COMMITTE--ETC F/G 15/5
AIR TRANSPORTATION BIBLIOGRAPHY.(U)
DEC 78 DOT-FA77WA-4079
UNCLASSIFIED 7801 FAA-EM-78-21 NL

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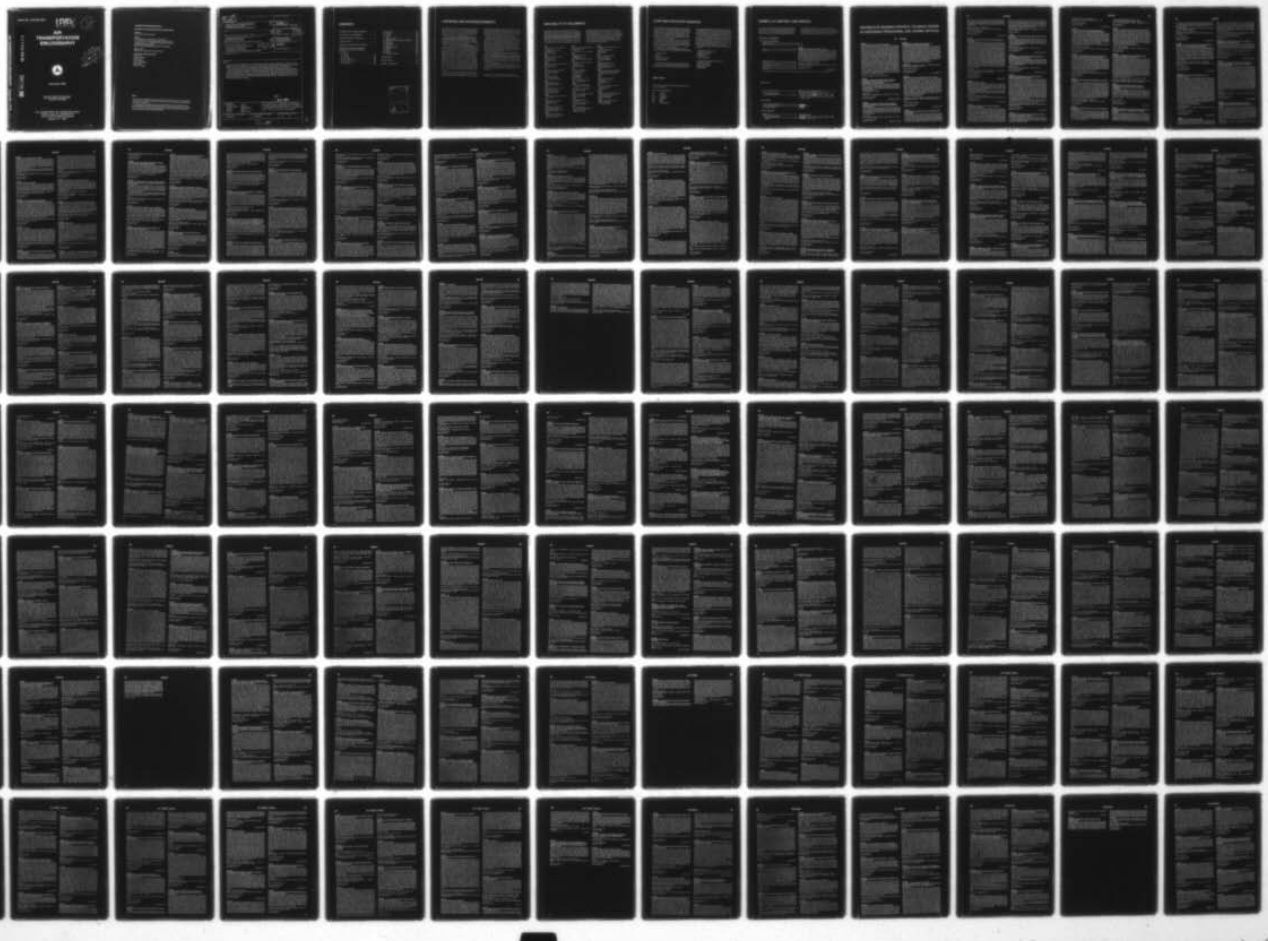

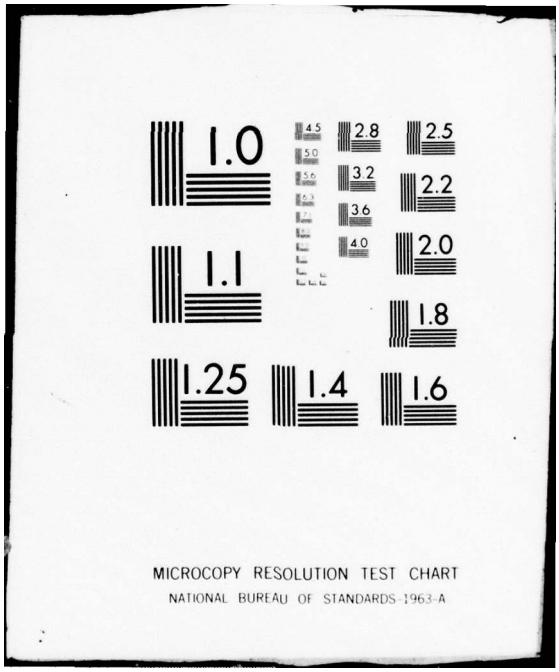
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NATIONAL BUREAU OF STANDARDS-1963-A

Report No. FAA-EM-78-21

AIR TRANSPORTATION BIBLIOGRAPHY

December 1978

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Office of Systems Engineering Management
Washington, D.C. 20591

AIR TRANSPORTATION BIBLIOGRAPHY December 1978

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December 1978

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7. Author(s)

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2101 Constitution Avenue, N.W., Washington, DC 20418

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Office of Systems Engineering Management
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U.S. Department of Transportation
800 Independence Avenue, N.W., Washington, DC 20591

13. Type of Report and Period Covered
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14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

A major purpose of this bibliography is to demonstrate the potential of a regular ATRIS abstract bulletin and to learn through feedback from recipients how such a bulletin might best be proposed to meet the information needs and wants of the air transportation community. Recipients are invited to suggest improvements for the publication.

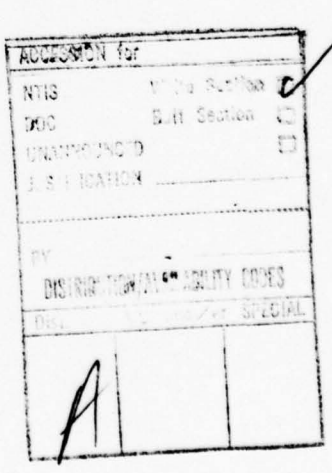
This prototype publication contains 1200 bibliographic citations and abstracts of journal articles, research reports, conference proceedings, and descriptions of computer programs and data bases. The material was selected from current air transportation literature and other contemporary sources and covers a wide range of air transportation subjects, including technology, operations, management, economics, and government planning. Arrangement of the abstract was prescribed by the Committee on Air Transportation Research Information Service. A Source Index, Subject Term Index, and Author Index are included.

411108

17. Key Words		18. Distribution Statement
Bibliographies	Airlines	Unlimited availability. Document may be released to the National Technical Information Service, Springfield, VA., 22161, for sale to the public.
Government policy	Economics	
Airports	Passenger demand	
Forecasts	Safety	
Aircraft	General aviation	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	236	

CONTENTS



FOREWORD AND ACKNOWLEDGMENTS

This bibliography is the third publication that has been prepared under the auspices of the Transportation Research Board Committee on Air Transportation Research Information Service (ATRIS) and through contractual agreement with the Federal Aviation Administration.

The first publication, ***Implementation Plan for an Air Transportation Research Information Service***,* defined information scope, described the potential user community, discussed costs and funding alternatives, and set forth specific procedures for input and output operations.

The second publication was ***Airports Bibliography***,* which provided a tangible means for confirming the potential user community of services that might be provided and for learning more about the community's needs and wants for ATRIS products and services. That bibliography contained nearly 800 references to reports and articles on various aspects of airports. The bibliography was mailed to approximately 1600 potential users of ATRIS and contained an in-depth response form that was completed and returned by approximately 120 recipients. In a follow-up survey of nonrespondents, approximately 400 additional recipients completed and returned a postcard questionnaire on user concerns and wants for air transport information. Approximately 60 percent of the respondents indicated that regular abstracts bulletins covering a wide range of air transport subjects would be useful.

This third report has been prepared as a prototype of the ATRIS abstracts bulletins that might be issued on a regular basis, perhaps quarterly or semiannually. It contains about 1200 abstracts of articles, reports, and other types of information in each of 21 subject areas that have been identified by the ATRIS Committee. It is intended that the contents be representative of the types of information that would be covered and included were ATRIS fully operational.

Responses from the recipients of this bibliography will provide additional guidance on the nature of future ATRIS operations. If there is adequate user support and if the necessary funds are available, the ATRIS data base will be developed and maintained at a level that makes it possible to provide useful information services. Depending on user wants and needs, these services can include special bibliographies, regular abstracts bulletins, batch-mode retrieval services, and on-line retrieval service.

Special acknowledgments are made to the National Aeronautics and Space Administration as a source of references, to the ***World Aviation Directory*** for its kind assistance in identifying certain elements of the potential user community, and to staff of the U.S. Department of Transportation, Library Services Division, for assistance in the review of the contents of this publication.

The Transportation Research Board is especially grateful for the contributions and support that have been provided by the ATRIS Committee and by the Federal Aviation Administration.

*Available from the Transportation Research Board, Attention ATRIS, 2101 Constitution Avenue, N.W., Washington, DC 20418.

AVAILABILITY OF DOCUMENTS

An availability statement is included with most abstracts. Addresses for ordering documents are given with the abstracts or with the publisher listing in the Source Index. ***Copies of reports and articles listed in this publication are not available from the Air Transportation Research Information Service.*** When ordering from any source, give full information on the item wanted. When ordering from the National Technical Information Service, be sure to give the NTIS accession number as well as the title and other information. When no availability is specified with an abstract, consult an established transportation library. A loan service for publications and a photocopy service for articles and papers are available at two TRISNET Centers as explained on page iv. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating those sources as follows:

AIAA
American Institute of Aeronautics and Astronautics
Technical Information Service
750 Third Avenue
New York, NY 10017

ASCE
American Society of Civil Engineers
Information Services
345 East 47th Street
New York, NY 10017

ASME
American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ATA
Air Transport Association of America
1709 New York Avenue, N.W.
Washington, DC 20006

CAA
Civil Aviation Authority
Space House, 43/49 King
London WC2B 6TE, England

CAB
Civil Aeronautics Board
1825 Connecticut Avenue, N.W.
Washington, DC 20428

DOT
U.S. Department of Transportation
Library Services Division
400 Seventh Street, S.W.
Washington, DC 20590

ECMT
All documents available through OECD (see below)

ESL
Engineering Societies Library
345 East 47th Street
New York, NY 10017

FAA
Federal Aviation Administration
Library Services Division
800 Independence Avenue, S.W.
Washington, DC 20591

GPO
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

IATA
International Air Transport Association
26 chemin de Joinville
P.O. Box 160
CH-1216 Cointrin-Geneva, Switzerland

ICAO
International Civil Aviation Organization
1000 Sherbrooke Street
Montreal, Quebec, Canada H3A 2R2

IEEE
Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

ITA
Institute of Air Transport
(Institut du Transport Aérien)
4 rue de Solferino
F 75007 Paris, France

NAE/NAS/NRC
National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, DC 20418

NASA
National Aeronautics and Space Administration, Headquarters Library
600 Independence Avenue, S.W.
Washington, DC 20546

NTIS
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

OECD
OECD Publications Center
Room 1207
1750 Pennsylvania Avenue, N.W.
Washington, DC 20006

OST
Office of the Secretary
U.S. Department of Transportation
400 7th Street, S.W.
Washington, DC 20590

RTAC
Roads and Transportation Association of Canada
1765 St. Laurent Boulevard
Ottawa, Ontario
Canada K1G 3V4

SAE
Society of Automotive Engineers
Publications Division
400 Commonwealth Drive
Warrendale, PA 15096

TRB
Transportation Research Board
Publications Office
2101 Constitution Avenue, N.W.
Washington, DC 20418

TRRL
Transport and Road Research Laboratory
Technical Information and Library Service
Crowthorne, Berkshire RG11 6AU
England

TSC
Transportation Systems Center
Technical Information Center
Kendall Square
Cambridge, MA 02142

UITP
International Union of Public Transport
19 avenue de l'Uruguay
B-1050, Brussels
Belgium

UMTA
Urban Mass Transportation Administration
Transit Research Information Center
2100 Second Street, S.W.
Washington, DC 20590

XUM
University Microfilms International
300 North Zeeb Road
Ann Arbor, MI 48106

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The Northwestern University Transportation Center Library and the University of California Institute of Transportation Studies Library are functioning as TRISNET Centers in the operation of a prototype document delivery system under contract to the U.S. Department of Transportation. The publications in this volume may be requested from either of these Document Delivery Centers.

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312-492-5273
TWX 910-231-0872

Institute of Transportation Studies Library
University of California
412 McLaughlin Hall
Berkeley, CA 94720
415-642-3604

ABBREVIATIONS

Abbreviations that appear frequently throughout this bibliography are listed below.

Document Data Abbreviations

App	Appendixes
Fig	Figures
N.p.	no pagination
Phot	Photographs
Ref	References
Rpt	Report
Tab	Tables
V.p.	Various pagination

EXAMPLE OF ABSTRACT AND INDEXES

Abstracts are classified according to an eight-digit document record number: The first two digits indicate the ATRIS subject area number, and the last six digits indicate the unique TRIS accession number. Subject areas appear at the tops of the pages in the abstract section. The document record number appears at the top of each abstract. Abstracts within each subject area are listed in ascending order of the accession numbers, although these usually will not be consecutive.

ABSTRACT OF A DOCUMENT

DOCUMENT RECORD NUMBER

Accession number
Subject area number

10 168576

Title → **FORECAST OF COMMUTER AIRLINES ACTIVITY**

Abstract → This report assesses the potential of the commuter airline industry including the identification of those short-haul low-density points that are likely prospects for future commuter service. The first section provides a national forecast of commuter airline enplanements, revenue passenger miles, number of aircraft operations and composition of fleet for 1975 to 1988. The second part of the report describes a model developed to disaggregate the activity forecast to individual points with existing service or anticipated future service, and provides forecasts for those points. (Author)

Supplementary notes → Aviation activity forecast 1977-1988.

Author(s) → Deosaran, G Sweezy, H Van Duzee, R

Publishing and document data → Federal Aviation Administration FAA-AVP-77-28, July 1977, 141 pp

Source of abstract → ACKNOWLEDGMENT: NTIS

Availability → ORDER FROM: NTIS

AD-A044804/3ST

Order number

SOURCE INDEX

Source of referenced document → **FEDERAL AVIATION ADMINISTRATION** 800 Independence Avenue, SW, Office of Aviation Medicine; Washington, D.C., 20591

Chapter and accession numbers for reference location →
03 154898, 03 177018, 05 154890, 05 154975, 05 174887, 05 175377, 06 154891, 10 159125, 10 168576, 10 169450, 10 174509, 13 180760, 17 166066, 18 169438, 18 175527, 18 176223, 19 166037, 19 167006, 19 167184, 19 169359, 19 175514, 19 175528, 19 175986, 19 175988, 19 175989, 19 179702

AUTHOR INDEX

Author of referenced document → **DEOSARAN, G**

Chapter and accession numbers for reference location →
10 168576, 10 173697

DESMAS, G
13 178259

SUBJECT TERM INDEX

Subject term → **COMMUTER AIRLINES**

Chapter and accession numbers of all references indexed to this term →
01 172780, 02 131573, 02 157779, 02 176626, 03 177020, 03 180676, 10 168576, 10 173697, 10 174509, 13 173875, 13 173876, 14 173874, 17 173842, 18 179303, 21 176727

ABSTRACTS OF RESEARCH REPORTS, TECHNICAL PAPERS IN CONFERENCE PROCEEDINGS, AND JOURNAL ARTICLES

01 Aircraft

01 152366
WORK CONTINUES ON TILT-ROTOR AIRCRAFT
Calspan has designed and fabricated a major portion of the automatic flight control system for the XV-15 tilt-rotor aircraft under a contract from Bell. Calspan's work on the XV-15 will continue in this year under two separate contracts. One contract calls for ground and flight checkout of the Calspan-designed and built automatic flight control system. Under the second contract, Calspan is investigating modifications that could be made to the XV-15 several years hence to make it adaptable as a handling-qualities research aircraft. The automatic flight-control system developed by Calspan for Bell Helicopter provides the XV-15's pilot with a means for sensing the control forces he is generating on his aircraft. A stability-and-control augmentation system is designed to make the aircrafts response to movements of stick and Rubber pedals easier for the pilot to control by making the aircraft's response to movements of stick and rubber pedals vary with forward speed. The SV-15 is one of the two VTOL tilt-rotor research aircraft that Bell Helicopter is producing under a joint contract with NASA/ Ames and the U.S. Army Air Mobility Research and Development Laboratory. The aircraft will be used to investigate the application of tilt-rotor technology to civilian and military missions. The rotors are mounted at the aircrafts wing tips on power pods that tilt so the aircraft can be flown either as a helicopter with the rotors pointed up, or as an airplane with the rotors converted forward. /ART/

Calspan News Analytic No. 16, Feb. 1977, pp 7-8

01 154413
AEROSPACE COMPUTER SYSTEMS. PART 1. AVIONICS APPLICATIONS. VOLUME 2. 1976-JANUARY 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)
Studies of computer hardware and supporting software for aircraft applications are presented. The bibliography includes research on onboard data processing equipment as well as navigation and guidance computers. (This updated bibliography contains 151 abstracts, all of which are new entries to the previous edition.)
Supersedes NTIS/PS-76/0042.

Grooms, DW
National Technical Information Service Bibliog. Mar. 1977, 156 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0126/1ST

01 154414
AEROSPACE COMPUTER SYSTEMS. PART 1. AVIONICS APPLICATIONS. VOLUME 1. 1964-1975 (A BIBLIOGRAPHY WITH ABSTRACTS)
Studies of computer hardware and supporting software for aircraft applications are presented. The bibliography includes research on onboard data processing equipment as well as navigation and guidance computers. (This updated bibliography contains 158 abstracts, none of which are new entries to the previous edition.)

Grooms, DW
National Technical Information Service Bibliog. Mar. 1977, 163 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0125/3ST

01 154502
DEVELOPMENT OF SMOKE ABATED AIRCRAFT CRASH/RESCUE FIRE FIGHTING TRAINER
It was shown previously that liquid petroleum fuels can be burned from a free surface without smoke generation by injecting a water spray near the surface of the burning fuel. This program concerned the extension of this smoke abatement method to aircraft crash/rescue trainers involving fire areas to about 3000 sq ft. Smoke abated fires of realistic severity for training purposes were obtained using either JP-4 or automotive gasoline, while JP-5 and No. 2 diesel oil were found ineffective for this purpose. Field experiments proved the compatibility of smoke-abated JP-4 fires with extinguishment using aqueous film-forming foam. A detailed design is presented for a 50-ft diameter smoke abated fire area for fire-fighting training together with step-by-step procedures for its operation. (Author)
See also Rept. no. AFHRL-TR-76-60, AD-A034 843.

Goldsmith, A
Illinois Institute of Technology Final Rpt. ITTRI-J6339, NAVTRA-EQUIPC74C01521, May 1976, 127 pp

Contract N61339-74-C-0152

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A035999/2ST

01 154535
INTEGRATED ENGINE INSTRUMENT SYSTEM. VOLUME I
Volume I contains the System Description of the Integrated Engine Instrument System (IEIS). In an effort to anticipate the needs of the flight crew and maintenance personnel in the 1980-85 timeframe, studies were conducted during the past five years to examine engine parameter definition and selection, sensor analysis, engine cycles, engine modeling, mission analysis, data trending, electronic fuel control, analog subsystems for vibration and turbine blade monitoring, display engineering, fault isolation techniques and human factors. The resulting baseline IEIS incorporates a variety of disciplines, including engine operation analysis, computers, multipurpose displays, data bus techniques, and data recording. Deck Launched Intercept and Subsonic Surface Surveillance missions were selected as typical applications for IEIS.
See also Volume 2, AD-A035 566.

Skovholt, RL Little, WS Doerle, WA Cooper, RB Buzzell, CE
General Electric Company Final Rpt. NADC-76180-30-V1, June 1976, 127 pp

Contract N62269-75-C-0359

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A035565/1ST

01 154565
A PARAMETRIC ANALYSIS OF VISUAL APPROACHES FOR HELICOPTERS
A flight investigation was conducted to determine the characteristic shapes of the altitude, ground speed, and deceleration profiles of visual approaches for helicopters. Two hundred thirty-six visual approaches were flown from nine sets of initial conditions with four types of helicopters. Mathematical relationships were developed that describe the characteristic visual deceleration profiles. These mathematical relationships were expanded to develop

equations which define the corresponding nominal ground speed, pitch attitude, pitch rate, and pitch acceleration profiles. Results are applicable to improved helicopter handling qualities in terminal area operations. (Author)

Subm-Prepared in Cooperation with Army Air Mobility R and D Lab., Hampton, VA.

Moen, GC Dicarlo, DJ Yenni, KR
Langley Research Center NASA-TN-D-8275, Dec. 1976, 41 pp

Contract DA 1F2-62209-AH-76

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-12066/5ST

01 154836
ANALYTICAL STUDIES OF SOME ACOUSTIC PROBLEMS OF JET ENGINES

The propagation and generation of acoustic waves in a choked nozzle is considered where pressure and entropy fluctuations caused by gas stream non-uniformities like 'hot spots,' are incident on the nozzle entrance. A novel noise-generation mechanism is found which produces acoustic waves of strength proportional to the entrance entropy fluctuation and local gradient of the mean flow velocity. A transformation is introduced which relates the solutions of problems involving the propagation of acoustic waves in a moving medium to the solutions of associated problems in a stationary medium. The method is described by discussing the Sommerfeld problem for a half plane in a subsonic flow. For supersonic case, all the diffraction problems are related to a single reference problem. A decomposition of the pressure field in a 'geometrical optics' field and a diffracted field is given, showing some remarkable similarities to the subsonic solution. The radiation of acoustic modes from a duct immersed in a subsonically moving medium is treated by a similar transformation. The presence of the uniform flow has roughly the same effect as, an increase in frequency of the incident wave, at constant mode number. The effect of acoustical lining on the radiation pattern is examined, and side radiation is shown to be greatly reduced for the lower order modes.

Candel, SM
Jet Propulsion Laboratory, Office of the Secretary of Transportation Intrm Rpt. DOT-TST-76-104, May 1976, 240 pp

Contract DOT-OS-20197

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-264918/4ST

01 155030
AIRCRAFT DESIGN CONCEPT

The passenger cabin in commercial aircraft is divided into forward and aft compartments allowing the wing carry-through structure to occupy space ordinarily reserved for passengers. Benefits are a stronger, smaller, more weight-efficient wing structure, larger fuselage fineness ratio, reduced weight and drag and increased fuel economy.

Subm-Sponsored by NASA. This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Neuman, FD Friebel, GO Sigalla, A
Langley Research Center Patent PAT-APPL-742-035, No Date, 10 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-15027/4ST

01 157778
TECHNOLOGY AND DECISION MAKING IN THE AIR TRANSPORT INDUSTRY

This article is a review of the literature and synthesis of factors involved in the innovation process in commercial aeronautical technology, which begins with new technological developments in aviation and culminates in the commercial use of new aircraft. The theses that arise from this review are the following: (1) new aircraft technology is developed exogenously--beyond the control of the air carriers, (2) technological developments are subsequently embodied in new aircraft at times dictated by competition among airframe manufacturers, and (3) given the nonprice nature of competition in the airline industry, the airlines are competitively induced to seek new aircraft and buy new aircraft that become available. In addition short discussions are provided of what may be called permissive factors in decisions about airline flight equipment such as the rate of traffic growth, rates of return, and aircraft-operating economies. The article concludes with a short discussion of how and why investment decision making about airline flight equipment may follow a different investment mode, stressing technical economic efficiency, during certain periods. /Author/

Schiffel, D (National Science Foundation) *Traffic Quarterly* Vol. 31 No. 2, Apr. 1977, pp 317-331

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01 158595
LIGHTER THAN AIR VEHICLES (CITATIONS FROM THE NTIS DATA BASE)

Design and applications of balloons, dirigibles, and airships are investigated in these Government-sponsored research reports. Passenger or cargo transport, timbering, tethering, and fabric selection are among the aspects investigated. Meteorological balloons are excluded. (Contains 192 abstracts)

See also NTIS/PS-77/0375.

Habercom, GE, Jr
National Technical Information Service May 1977, 197 pp

ACKNOWLEDGMENT: NTIS
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NTIS/PS-77/0374/7ST

01 158596
LIGHTER THAN AIR VEHICLES (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)

Design and applications of balloons, dirigibles, and airships are investigated in these reports gathered in a worldwide literature survey. Passenger or cargo transport, timbering, tethering, and fabric selection are among the aspects investigated. Meteorological balloons are excluded. (Contains 62 abstracts)

See also NTIS/PS-77/0374.

Habercom, GE, Jr
National Technical Information Service May 1977, 69 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0375/4ST

01 159198
DESIGN AND PERFORMANCE OF ENERGY EFFICIENT PROPELLERS FOR MACH 0.8 CRUISE

The increased emphasis on fuel conservation in the world has stimulated a series of studies of both conventional and unconventional propulsion systems for commercial aircraft. Preliminary results from these studies indicate that a fuel saving of 14 to 40 percent may be realized by the use of an advanced high-speed turboprop. This turboprop must be capable of high efficiency at Mach 0.8 cruise above 9.144 km altitude if it is to compete with turbofan powered commercial aircraft. Several advanced aerodynamic concepts were investigated in recent wind tunnel tests under NASA sponsorship on two propeller models. These concepts included aerodynamically integrated propeller/nacelles, area ruling, blade sweep, reduced blade thickness and power (disk) loadings several times higher than conventional designs. The aerodynamic design methodology for these models is discussed. In addition, some of the preliminary test results are presented which indicate that propeller net efficiencies near 80 percent were obtained for high disk loading propellers operating at Mach 0.8.

Conf-Presented at the 1977 Natl. Business Aircraft Meeting and Exposition, Wichita, Kas. 29 Mar.-1 Apr. 1977; Sponsored by Sae Century 2.

Mikkelson, DC Blaha, BJ Mitchell, GA Wikete, JE
National Aeronautics and Space Administration NASA-TM-X-73612, E-9095, 1977, 32 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-20109/3ST

01 159210
HUMAN FACTORS IN DESIGN OF PASSENGER SEATS FOR COMMERCIAL AIRCRAFT: A REVIEW

Seat comfort and safety research since the early part of the century is reviewed. The approach blends empirical and theoretical human factors and technical knowledge of seated humans under static and dynamic conditions experienced on commercial aircraft.

Schaedel, SF Jacobson, ID Kuhlthau, AR
Virginia University NASA-CR-152627, Mar. 1977, 36 pp

Contract NGR-47-005-181

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-20775/1ST

01 164931
APPLICATION OF VOID FILLER FIRE PROTECTION MATERIALS TO DEAL WITH AIRCRAFT FIRE THREATS

A different approach for the reduction of fire hazards in aircraft through the use of void filling lightweight rigid foam materials and intumescent coatings and sheet materials is reported. Applications of the foams and intumescent materials as fire barriers in a variety of vital regions of several types of aircraft have been designed and evaluated. These material systems working together to combat the ravages of fire as an aircraft fire barrier are explained and their thermal performances are described. Design considerations involved in fire barrier aircraft applications are discussed.

Proceedings of the First Intl Conference on Fire Safety, San Francisco University, January 12-16, 1976.

Patterson, DM (Avco Corporation)
San Francisco University Press Conf Paper 1976, pp 155-174, 6 Ref.

ACKNOWLEDGMENT: EI
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01 164936
VALUE OF FLEET EXPERIENCE IN EXPLOITING THE FULL ECONOMIC POTENTIAL OF AIRCRAFT STRUCTURES

As a fleet of aircraft builds more and more experience in the real operational environment, the data flowing from that experience can contribute significantly to better forecasts of future maintenance needs and costs, better focus of the inspection and maintenance efforts, special new equipment/techniques to reduce costs in specific cases, high confidence in continued safe operation. Several extensions of historical approaches have been developed to support the early models of the jet fleet. The general characteristics of these techniques and their potential economic contributions are discussed.

Prepared for SAE Meeting 29 Nov.-2 Dec. 1976.

Craig, LE (Boeing Company) Hummel, KH
Society of Automotive Engineers Preprint SAE 760913, 1976, 14 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 164937
IMPACT OF EFFECTIVENESS CONSIDERATIONS ON DESIGN SYNTHESIS

The scope of recent aircraft preliminary design studies has been expanded to include effectiveness considerations for configuration justification. Today's designer must therefore examine not only the interactions between traditional aircraft parameters (e.g. wing planform variables, engine cycle variables); he must determine how those parameters impact mission requirements. He must deal with more variables and new resource criteria. Statistical experiments and numerical search techniques are required to perform the optimization process, and combat effectiveness becomes the selection criteria. This report summarizes how optimization techniques and a campaign force effectiveness model have been incorporated into Vought's Aircraft Synthesis Analysis Program (ASAP) to perform these studies.

Prepared for SAE Meeting 20 Nov.-2 Dec. 1976.

Roch, AJ (Vought Corporation) Ladner, FK
Society of Automotive Engineers Preprint 1976, 17 pp, 10 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 164938
SIMULATION'S POTENTIAL ROLE IN ADVANCED AIRCRAFT CERTIFICATION

It is the opinion of the FAA that future developments in air transportation will introduce significantly greater complexity into the aircraft and the operating system than now exists. Past experience with simulation techniques indicate they contain the potential of contributing significantly to the safe and rapid introduction of these new technologies. It is the intent of the FAA to explore this potential in detail to ensure that maximum values can be gained thru its exploitation.

Prepared for SAE Meeting 29 Nov.-2 Dec. 1976.

Cayot, JE (Federal Aviation Administration) Harper, CW
Society of Automotive Engineers Preprint SAE 760931, 1976, 3 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 164939
FLIGHT DISPLAYS FOR THE NEXT GENERATION AIRCRAFT

The increasing complexity of the operational environment will dictate the requirement, and the advanced technology will provide improved information transfer warranting the conclusion. The next generation of commercial transports will no longer be designed principally for manual controls with electromechanical instruments. The cockpit designs of new aircraft will incorporate instruments and displays with digital interfaces and effective monitoring to exploit the inherent advantages of automatic controls. Modern systems engineering will be applied to the design of caution and warning systems and the designs of advanced sytems, such as multifunction switching, to reduce crew workload and stress.

Prepared for SAE Meeting 29 Nov.-2 Dec. 1976.

Dunn, R (Boeing Company)
Society of Automotive Engineers Preprint SAE 760930, 1976, 9 pp

ACKNOWLEDGMENT: EI
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01 165308
THE NEXT COMMERCIAL JET TRANSPORT: THE NEED, ECONOMICS, TECHNOLOGY, & FINANCING

The nine papers presented were initiated by the interest on the part of economists, engineers, airlines and the financial community in the impending mandatory modification or replacement of airline equipment. Three papers (The Next Commercial Transport-What? When? Why?: The American Airlines View; An Optimistic View of the Plan Facts; and the Next Generation Commercial Aircraft-International Perspective) addressed the varying needs of the airlines as to size, mission and economics. The banker's view of the future financing prospects of the airlines is outlined in another paper. Technical experts presented papers covering the role of the powerplant and the lead time necessary to develop and provide a new engine. A panel of design and planning engineers outlined their plans for future aircraft and discussed them in terms of today's air transportation environment.

Papers present at the Air Transportation Research International Forum, San Francisco, California, May 9, 1977.

Northwestern University, Evanston 1977, 123 pp, Figs., 5 Tab.

ORDER FROM: Northwestern University, Evanston, Transportation Center, Leverone Hall, 2001 Sheridan Road, Evanston, Illinois, 60201

01 166207
APPLICATIONS OF ADVANCED V/STOL AIRCRAFT CONCEPTS TO CIVIL UTILITY MISSIONS. VOLUME 2: APPENDICES

The linear performance definition curves for the lift fan aircraft, tilt rotor aircraft, and advanced helicopter are given. The computer program written to perform the mission analysis for this study is also documented, and examples of its use are shown. Methods used to derive the performance coefficients for use in the mission analysis of the lift fan aircraft are described.

Aerospace Corporation Final Rpt. NASA-CR-151988, Feb. 1977, 196 pp

Contract NAS2-8710

ACKNOWLEDGMENT: NTIS
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N77-22097/8ST

01 166228
STUDY OF THE IMPACT OF CRUISE SPEED ON SCHEDULING AND PRODUCTIVITY OF COMMERCIAL TRANSPORT AIRCRAFT

A comparison is made between airplane productivity and utilization levels derived from commercial airline type schedules which were developed for two subsonic and four supersonic cruise speed aircraft. The cruise speed component is the only difference between the schedules which are based on 1995 passenger demand forecasts. Productivity-to-speed relationships were determined for the three discrete route systems: North Atlantic,

Trans-Pacific, and North-South America. Selected combinations of these route systems were also studied. Other areas affecting the productivity-to-speed relationship such as aircraft design range and scheduled turn time were examined.

Subm-Prepared in Cooperation with Trans World Airlines, Inc., Kansas City, Mo. and Braniff International.

Bond, EQ Carroll, EA Flume, RA
Lockheed Aircraft Corporation Final Rpt. NASA-CR-145189, Apr. 1977, 108 pp

Contract NAS1-14435

ACKNOWLEDGMENT: NTIS
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N77-24074/5ST

01 166680
FACTORS AFFECTING THE CORPORATE DECISIONMAKING PROCESS OF AIR TRANSPORT MANUFACTURERS

Fuel economy is a pivotal question influencing the future sale and utilization of commercial aircraft. The NASA Aircraft Energy Efficiency (ACEE) Program Office has a program intended to accelerate the readiness of advanced technologies for energy efficient aircraft. Because the decision to develop a new airframe or engine is a major financial hazard for manufacturers, it is important to know what factors influence the decision making process. A method is described for identifying and ranking individuals and organizations involved at each stage of commercial air transport development, and the barriers that must be overcome in adopting new technologies.

Ollila, RG Hill, JD Noton, BR Duffy, MA Epstein, MM
Battelle Columbus Laboratories Final Rpt. NASA-CR-154618, Dec. 1976, 118 pp

Contract NASW-2970

ACKNOWLEDGMENT: NTIS
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N77-27020/5ST

01 167332
ENGINEERING SUMMARY OF POWERPLANT ICING TECHNICAL DATA

The problem of aircraft engine icing is caused by the existence of liquid water droplets in atmospheric clouds at temperatures below freezing. The disturbance resulting from an airplane flying through these supercooled droplets causes the formation of ice on the impinging surfaces. Aircraft engines ingest these droplets in concentrations of roughly fifty percent greater than the cloud concentration, and the first few stages of the engine compressor are subject to icing. Engine icing can be prevented, or at least kept within tolerable limits, by engine design procedures which utilize: the tendency of the rotor to shed ice by centrifugal effects before it gets too thick, the tendency of the fan to create warmer temperatures by compression effects, and various designs of active anti-icing systems. This report provides the aircraft engine designer with appropriate background information, and with sufficient equations and design charts, and instructions regarding their use, such that a logical approach to the complex problem of engine ice prevention can be established and understood. A technical data review and discussion of current practices of test verification procedures are presented to give visibility to those areas of atmospheric icing phenomena which can be realistically simulated by experiments, and to point out those areas in which more research is needed. (Author)

See also Rept. no FAA-ADS-4, AD-608 865.

Pfeifer, GD Maier, GP
Pratt and Whitney Aircraft Final Rpt. FAA-RD-77-76, PWA-5522, July 1977, 203 pp

Contract DOT-FA76WA-3840

ACKNOWLEDGMENT: NTIS
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AD-A045087/4ST

01 167522
VIBRATION AND PASSENGER COMFORT

This paper considers the effects of vehicular vibration on passenger comfort and reports the results of a series of questionnaire investigations to examine both the qualitative and quantitative effects of vibration. Although in their infancy, it is argued that field investigations of the type described in this paper are of more value to the design engineer than are many of the investigations carried out under laboratory conditions. However the author points out that the measurement errors and problems incurred during field investigations are much increased compared with laboratory studies. Relationships between vibration and motion intensity and journey comfort level are shown graphically.

Oborne, DJ (University College, Swansea) *Applied Ergonomics* Analytic Vol. 8 No. 2, June 1977, pp 97-101, 3 Fig., 10 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-228238)
ORDER FROM: ESL

01 168653
CLOSED LOOP CONTROL SYSTEMS. PART 1. AIRCRAFT (A BIBLIOGRAPHY WITH ABSTRACTS)

Adaptive control and feedback control closed loop systems relative to aircraft flight control are investigated. Studies on guidance and control of drones and remotely piloted vehicles are included. (This updated bibliography contains 97 abstracts, 65 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0618, and Updates NTIS/PS-75/364.

Habercom, GE, Jr
National Technical Information Service Sept. 1977, 102 pp

ACKNOWLEDGMENT: NTIS
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NTIS/PS-77/0800/1ST

01 168952
CERTIFICATION STUDY OF A DERIVATIVE MODEL OF A SMALL JET TRANSPORT AIRPLANE USING A PILOTED RESEARCH SIMULATOR

The Flight Simulator for Advanced Aircraft (FSAA) at Ames Research Center was used to evaluate the flying qualities of a small jet transport and those of a derivative model of that airplane. The objective was to define technical criteria that piloted simulations must meet to enable their increased use for demonstrating compliance with transport category aircraft airworthiness requirements. Flying-qualities data were obtained for numerous test configuration and conditions using conventional certification flight test procedures. These data correlated well with the basic airplane data from the manufacturer's certification test report. Analysis of the simulator data showed valid results in critical test cases, such as the demonstration of static longitudinal stability and minimum control speed, with confidence that all influencing and limiting factors were identified. An important aspect was the accurate simulation of the control force-feel qualities of the reversible flight control system. The simulator was judged to have duplicated actual flight results with a high degree of confidence. It is concluded that it is technically feasible to pursue the increased use of simulation in conducting derivative airplane certification evaluations of the scope reported in this report. (Author)

Forrest, RD
Federal Aviation Administration Final Rpt. FAA/RD-77/105, June 1977, 86 pp

ACKNOWLEDGMENT: NTIS
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AD-A046442/0ST

01 169046
A TRADE-OFF ANALYSIS DESIGN TOOL. AIRCRAFT INTERIOR NOISE-MOTION/PASSENGER SATISFACTION MODEL

A design tool was developed to enhance aircraft passenger satisfaction. The effect of aircraft interior motion and noise on passenger comfort and satisfaction was modelled. Effects of individual aircraft noise sources were accounted for, and the impact of noise on passenger activities and noise levels to safeguard passenger hearing were investigated. The motion noise effect models provide a means for tradeoff analyses between noise and motion variables, and also provide a framework for optimizing noise reduction among noise sources. Data for the models were collected onboard commercial aircraft flights and specially scheduled tests.

Jacobson, ID
Virginia University Final Rpt. NASA-CR-154807, Sept. 1977, 213 pp

Grant NSG-1180

ACKNOWLEDGMENT: NTIS
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N77-30750/2ST

01 169063
RATE EFFECTS ON RESIDUAL STRENGTH OF FLAWED STRUCTURES AND MATERIALS
The literature is reviewed with respect to tests conducted to investigate crack re-initiation under dynamic loads and arrest of a running crack; metallurgical sources of rate effects; available data for aerospace engineering materials; and mechanical sources of rate effects, dynamic crack tip stresses and kinetic energy effects. Conclusions are drawn and recommendations made.

Vanleeuwen, HP Schra, L
National Aerospace Laboratory, Netherlands NLR-TR-76004-U, Dec. 1975, 81 pp

Contract LI/LW/4969

ACKNOWLEDGMENT: NTIS
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N77-29565/7ST

01 169138
RIDE CHARACTERISTICS OF CATAMARAN SEA LOITER AIRCRAFT IN A SEAWAY
Results from model tests of a catamaran sea loiter aircraft model conducted by The Netherlands Ship Model Basin in 1966 are reviewed. Data are also presented from recent tests of a similar model conducted at the David W. Taylor Naval Ship Research and Development Center. Results from both test programs show that the catamaran hull spacing has little effect on longitudinal motions; lateral motions are strongly affected by hull spacing. The heave and pitch reasonant frequencies are nearly equal. Hull geometry (other than spacing) and the location of the center of gravity have little effect on motions. The gross size of the aircraft and the various radii of gyration do influence motions. Little damping in roll and pitch is present. Motions of full-scale aircraft are extrapolated from these model results. These scaled data are compared to numerical predictions for similar designs. Heave accelerations at the center of gravity compare favorably; pitch and roll motions do not compare well. (Author)

Papadales, BSJ
David Taylor Naval Ship R&D Center, (SSH15) Final Rpt. DTNSRDC/ASED-384, June 1977, 47 pp

ACKNOWLEDGMENT: NTIS
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AD-A045363/9ST

01 169378
ASD STROBE LIGHT EVALUATION
This report presents a synopsis of the literature search and testing conducted by ASD from 3 June 1975 to 22 October 1976 in an attempt to determine the specification requirements for strobe anticollision lights. The literature search resulted in a draft military specification for aircraft anticollision strobe lights which was circulated to the using commands and industry for comments 27 February 1976. Since the literature search had not provided quantitative data relative to required intensity, further investigation was deemed necessary. Testing was designed to generate data which could be extrapolated to determine intensity requirements for the specification. Test results indicate that strobe lights of intensities far exceeding those practical for aircraft installation would be required. The total effort resulted in the ASD recommendation that the proposed strobe light specification not be published as the visibility enhancement characteristics of the strobe lights when compared to the midair threat environment, offer very little, if any, added protection against midair collisions. ASD also recommended that the 'Force Wide Retrofit' action item of the General Officer Panel for Safety Matters be deleted. Any future strobe light activity should be based upon potential Life Cycle Cost advantages when they are used as functional replacements for the present rotating beacons. It was also recommended that the Midair Prevention System program, which was an outgrowth of early ASD proposals and provides a systematic approach to the midair collision problem, be continued. (Author)

Schmidlapp, PL
Aeronautical Systems Division, (2713) Final Rpt. ASD-TR-77-3, June 1977, 211 pp

ACKNOWLEDGMENT: NTIS
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AD-A045533/7ST

01 169451
ANTONIO FERRI SELECTED PAPERS ON ADVANCED DESIGN OF AIR VEHICLES
This publication contains a selection of ten papers by Professor Antonio Ferri, who died in 1976 after many years association with AGARD. These papers are concerned with the advanced design of air vehicles. They are published to bring together in one place examples of Professor Ferri's most important contributions to aerospace research and development. A biography of Professor Ferri is included, together with a bibliography of his works, and tributes from his friends and colleagues.
Text in English and French.

Advisory Group for Aerospace Res & Dev-NATO AGARD-ograph-226, Aug. 1977, 135 pp

ACKNOWLEDGMENT: NTIS
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AD-A046544/3ST

01 170188
SOME ASPECTS OF AIRCRAFT WAKE BEHAVIOR NEAR THE GROUND
This paper presents the results of an investigation into vortex wake behavior and describes the effect of ground surface proximity on sinuous instability and breakup times.
Conference on Aerosp and Aeronaut Meteorol and Symp on Remote Sensing from Satellite, 7th Preprint, Melbourne, Florida, November 16-19, 1976.

American Meteorological Society Proceeding 1976, pp 34-41, 16 Ref.

ACKNOWLEDGMENT: EI
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01 170194
STRUCTURAL MATERIALS RESEARCH FOR LIGHTER-THAN-AIR VEHICLES
The new organic fiber, Kevlar, is a recent and most significant advancement that justified re-examination of old and new inflatable materials' application. A fertile frontier exists in integrating Kevler with various other material combinations, in optimization of geometric features, and in selection of thermomechanical characteristics compatible with the environment. Expectations regarding Kevlar has been justified by the performance of experimental materials. Styrene-butadiene-styrene block copolymers appear promising as a constituent adhesive for low-temperature applications.

Alley, VL, Jr (Langley Research Center) McHatton, AD *Journal of Aircraft* Vol. 14 No. 3, Mar. 1977, pp 239-243, 12 Ref.

ACKNOWLEDGMENT: EI
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01 170195
PROPELLER AIRCRAFT FLYOVER NOISE TESTING
This paper presents a review of a typical flyover noise test procedure used to certify light propeller aircraft of 5700 KG (12,500 lbs.) or less gross weight to ICAO Annex 16 and FAR 36 standards. The criteria specified are not the only acceptable basis for performing these tests, but do present an approved method for showing compliance with the regulation(s).
Prepared for SAE Meeting 28 Feb-4 March, 1977.

Shreve, JC (Cessna Aircraft Company)
Society of Automotive Engineers Preprint SAE 770443, 1977, 8 pp

ACKNOWLEDGMENT: EI
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01 170197
INTERIOR NOISE ANALYSIS AND CONTROL FOR LIGHT AIRCRAFT
This paper describes experimental and analytical studies of the interior noise of twin-engine, propeller-driven, light aircraft. Experimental results indicate that interior noise levels due to propeller noise can be reduced by reduction of engine rpm at constant airspeed (about 3 dB), by synchronization of the twin engines/propellers (up to 12 dB), and by increasing the distances from propeller tip to fuselage. The analytical model described uses modal methods

and incorporates the flat-sided geometrical and skin-stringer structural features of light aircraft. Initial results show good agreement with measured noise transmitted into a rectangular box through a flat panel.

Prepared for SAE Meeting 28 Feb-4 March, 1977.

Mixson, JS (Langley Research Center) Vaicaitis, R Barton, CK
Society of Automotive Engineers Preprint SAE 770445, 1977, 12 pp, 18 Ref.

ACKNOWLEDGMENT: EI
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01 172453
RELIABILITY-CENTERED MAINTENANCE

This paper describes a logical discipline that enables the development of efficient scheduled (i.e. preventive) maintenance programs for complex equipment, and the ongoing management of such programs. Such programs are called reliability-centered maintenance programs because they are centered on achieving the inherent safety and reliability capabilities of equipment at a minimum cost. There are only four types of tasks in a scheduled maintenance program. Mechanics can be asked to: (1) Inspect an Item to detect a potential functional failure. (2) Rework an item before a maximum permissible age is exceeded. (3) Discard an item before a maximum permissible age is exceeded. (4) Inspect an item to find failures that have already occurred but were not evident to the operating crew. Two or more types of tasks are applicable to some equipment items. There are other items to which only one type of task is applicable. And there are many items to which no type of preventive maintenance task is applicable. Very often a task which is applicable is not effective and should not be included in the scheduled maintenance program. The problem, therefore, is to determine which types of maintenance tasks, if any, should be applied to an item. The reliability-centered maintenance program designer solves this problem by using decision diagrams to lead to quick, consistent and correct identification of the type of maintenance task that is both applicable and effective for each significant item of the equipment. The decision diagrams are similar in concept to those used by the air transport industry since 1968 (and described in Air Transport Association publications MSG-1 and MSG-2) but are more fully developed to enable more complete and accurate analyses. This discussion is based upon recent developments which have occurred during the preparation of two books, one on the philosophy and theory of reliability-centered maintenance and the other on application of the theory to the design of maintenance programs for specific types of complex equipment. /Author/

IEEE Reliability and Maintainability, Annual Symposium, Proceedings, Los Angeles, California, January 24-26, 1978.

Nowlan, FS Heap, HF
Institute of Electrical and Electronics Engineers Conf Paper 1978, 7 pp, 9 Ref.

ORDER FROM: ESL

01 172460
ROLLING RESISTANCE OF AIRCRAFT WHEELS IN DRY SNOW [Flygplanshjuls rullmotstaand i torr nysnoe]

This report deals with measurements of the rolling resistance of an aircraft wheel caused by dry snow. The wheel was equipped with a tyre of dimension 12.50-16. The measurements were carried out at a static wheel load of 38.800 n and tyre pressures of 410 kpa and 550 kpa. The speed during the measurements was 50 km/h. The rolling resistance increased approximately proportionally with increasing snow depth at a constant tyre pressure. Increased tyre pressure caused a decrease of the rolling resistance. This effect indicates that tyres with high pressure should be used on aircraft wheels when taking off from snow-covered areas, even if the load on the wheels does not require a high tyre pressure. Furthermore measurements have been carried out of the rolling resistance of a tyre of the dimension 7.50-14 caused by dry snow at different speeds. This tyre is especially intended for friction measurements (ASTM tyre). These measurements were performed at a static wheel load of 4.800 n and at speeds of 50, 65 and 80 km/h. The rolling resistance increased proportionally with increasing speed within the interval of speed used. The speed dependence of the rolling resistance increased with the snow depth. /TRRL/ [Swedish]

Kihlgren, B
National Swedish Road & Traffic Research Institute Monograph VTI Rpt 128, 1977, 32 pp, 8 Fig., 16 Tab., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-230526)

01 172703
ADVANCES IN ENGINEERING SCIENCE, VOLUMES 1 THROUGH 4, 1976

The technical program of the 13th Annual Meeting of the Society of Engineering Science, Inc., consisted of 159 invited and contributed papers covering a wide variety of research topics. These Proceedings, which contain the technical program of the meeting, are presented in four volumes arranged by subject material. Papers in materials science are contained in Volume I. Volume II contains the structures, dynamics, applied mathematics, and computer science papers. Volume III contains papers in the areas of acoustics, environmental modeling, and energy. Papers in the area of flight sciences are contained in Volume IV.

Presented at the 13th Annual Meeting of the Society of Engineering Science, Hampton, Virginia, November 1-3, 1976.

National Aeronautics and Space Administration Proceeding NASA CP-2001, 4 Vol, 1976, 1782 pp

ACKNOWLEDGMENT: EI
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01 172725
VORTEX INTERACTIONS IN MULTIPLE VORTEX WAKES BEHIND AIRCRAFT

Several different configurations of a 0.61-m(2-ft) span model of a Boeing 747-type transport aircraft were tested to allow observation of typical vortex interactions and merging in multiple vortex wakes. Wingspan loading and model attitude were found to effect both vortex motions within the wake and resulting far-field wake velocity. Landing-gear deployment caused a far-field reformation of vorticity behind a model configuration which dissipated concentrated vorticity in the near-field wake. Circulation from the wing always caused a downward movement of the horizontal tail vortices, which merged with wing vortices. A modified landing configuration was developed that appeared to significantly alleviate the concentrated wake vorticity associated with the current landing configuration.

Ciffone, DL (Ames Research Center) *Journal of Aircraft* Vol. 14 No. 5, May 1977, pp 440-446, 14 Ref.

ACKNOWLEDGMENT: EI
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01 172728
FLIGHT TEST TECHNIQUES

Proceedings includes 25 papers on aircraft in-flight testing. The papers concentrate on the following three subject areas: weapons systems clearance, devoted to techniques used in flight clearance of the basic air vehicle including flight control systems, engines, engine inlet systems, and the externally carried weapons; weapon system development and evaluation; and advances in the state-of-the-art of instrumentation systems and components, data transmission and processing, and airborne displays. Selected papers are indexed separately.

AGARD Conference Papers presented at the Flight Mechanics Panel Symp, Porz Wahn, Germany, October 11-14, 1976.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 223, Apr. 1977, 434 pp

ACKNOWLEDGMENT: EI
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01 172729
FRACTURE MECHANICS DESIGN METHODOLOGY

Proceedings includes 11 papers which illustrate how fracture mechanics is used in the design of aircraft structures and their components. The following areas are addressed: practical applications of fracture mechanics in the design of new aircraft; durability and damage tolerance assessment in aircraft in service; design methodology for built-up sheet structures; selection of aircraft structural materials using fracture mechanics; and some special problems. Selected papers are indexed separately.

AGARD Conference Papers presented at the Strucutre and Materials Panel (43rd), London, England, September 28-29, 1976.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 221, Feb. 1977, 278 pp

ACKNOWLEDGMENT: EI
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01 172730
PREDICTION OF AERODYNAMIC LOADING
Proceedings includes 26 papers primarily concerned with the fluid dynamics aspects of predicting aerodynamic loads on aircraft and their external stores, and in particular, those loads that cause difficult design and operating problems. Emphasis is placed on theoretical and semiempirical methods for determining the level and distribution of the expected loading, and on assessing and evaluating the accuracy of the predicted values. Selected papers are indexed separately.

AGARD Conference, Paper and Discussion from the Fluid Dynamics Panel Symp, NASA Ames Research Center, Moffett Field, California, September 27-29, 1976.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 204, Feb. 1977, 342 pp

ACKNOWLEDGMENT: EI
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01 172731
ACTIVE CONTROL TECHNOLOGY
The use of active control technology to achieve artificial stability, ride improvement, load alleviation, flutter speed enhancement, center-of-gravity control, envelope limiting, and fatigue reduction is discussed. In addition, recent advances in adaptive control technology and signal theory which have made possible a wider application of active control technology are reviewed.

Simpson, A (Bristol University, England) Hitch, HP *Aeronautical Journal* Vol. 81 No. 798, June 1977, pp 231-246, 35 Ref.

ACKNOWLEDGMENT: EI
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01 172736
CANADIAN STOL DEMONSTRATION--THE DATA COLLECTION, THE FINDINGS AND THEIR APPLICATIONS
The Canadian Government sponsored a STOL Demonstration Service to commercial air carrier standards between the cities of Montreal and Ottawa between August 1974 and March 1976. The objectives of this program were to test the technical feasibility and public acceptance of STOL systems. The Canadian Air Transportation Administration (CATA) STOL Project Team conducted a data collection and monitoring exercise capable of providing the information required to establish the technical standards and operational procedures for STOL transportation. This paper describes the demonstration operating concepts and the data collection exercises and summarizes the results, showing how they will be used to make recommendations for the regulation and control of future Canadian STOL systems.

Rosewarne, HP Spruston, DD *Canadian Aeronautics and Space Journal* Vol. 23 No. 4, July 1977, pp 217-235

ACKNOWLEDGMENT: EI
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01 172737
DYNAMICS OF STOL
This paper is concerned with factors which influenced the design of STOL/Utility aircraft in Canada. These included the early research work, experience with bush aircraft, and the stimulus of the Guggenheim Safe Aircraft Competition. The acceptance of STOL in remote areas and for low-density traffic on short-haul routes is compared with the many obstacles that exist to acceptance in transportation systems on a national scale. Areas in need of more advanced development in high-lift aerodynamics, drag, and propulsion are described. The paper concludes with observations on the potential of the STOL aircraft to reduce energy demands in transportation.

Hiscocks, RD (National Research Council of Canada) *Canadian Aeronautics and Space Journal* Vol. 23 No. 4, July 1977, pp 201-211, 23 Ref.

ACKNOWLEDGMENT: EI
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01 172738
PREDICTION OF DESIGN AND DEVELOPMENT COSTS OF CIVIL AIRLINERS
In this paper the authors describe some of the methods they use in predicting aircraft development costs. The historical background against which the methods have evolved is reviewed, and some of the problems encountered in the application of these methods are discussed. The methods fall into three classes--namely, empirical, statistical, and so-called "experiential" , the fundamental principle is that the project is broken down into a hierarchical tree of work elements or tasks, appropriate to the stage of project definition being considered, with estimates then being made for each individual task. Of the three methods of estimating design and development the 'experiential' method of summating assessments of the smallest task elements relevant to the stage of the project suffers least, in the authors' experience, from uncertainty and is the most likely to give a result of acceptable accuracy. In addition, and equally important, it provides a firm base for planning and control and it is the only method which can be subjected to reasoned examination.

Harrold, KC (Hawker Suddeley Aviation) Nicol, SI *Aeronautical Journal* Vol. 81 No. 796, Apr. 1977, p 139, 6 Ref.

ACKNOWLEDGMENT: EI
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01 172741
AUTOMATED TESTING OF FLIGHT INSTRUMENTS
The paper discusses present-day specifications for such flight instruments as altimeters, air-data computers, and air-speed indicators, which involve hundreds of calibration test points. Manual inspection of instruments of this type requires highly skilled personnel and a significant investment in terms of direct-labor man-hours. Several automated punched-tape-controlled systems for flight-instrument testing have been designed to reduce the costs of manual inspection.

SME Tech Paper Series EM, Misc Tech Paper-Book 1.

Muhs, DP (Bendix Corporation)
Society of Manufacturing Engineers SME EM76-974, Dec. 1976, 11 pp

ACKNOWLEDGMENT: EI
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01 172743
HANDLING QUALITY CRITERION FOR HEADING CONTROL
A heading control criterion based on the aileron-rudder sequencing required to achieve coordinated turns is presented. Quantification of the aileron-rudder shaping is obtained by consideration of the ideal crossfeed which completely eliminates sideslip induced by aileron inputs. The shaping and gain parameters based on this ideal crossfeed are defined and correlated with pilot opinion ratings. Excellent correlation is obtained with data from simulation of STOL, fighter aircraft, and space shuttle vehicles.

Hoh, RH (Systems Technology, Incorporated) Ashkenas, IL *Journal of Aircraft* Vol. 14 No. 2, Feb. 1977, pp 142-150, 15 Ref.

ACKNOWLEDGMENT: EI
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01 172753
AERODYNAMIC NOISE
Proceedings include 10 papers providing an up-to-date account and appraisal of aerodynamic noise concepts, theory, and experiments. Particular emphasis is given to practical methods for the prediction, measurement, and reduction of external noise from jet/fan aircraft. Detailed attention is given to the theory of aerodynamic noise generation and propagation, acoustics of jet efflux noise, engine exhaust noise characteristics, fan noise, airframe self-noise, airframe/engine interaction effects, aero-acoustic measurement and analysis techniques, aircraft flyover noise measurement, and noise source identification and location methods.

AGARD Lecture Series, Aerodynamic Noise, at von Karman Inst Meet, Rhode St., Genese, Belgium, December 6-9, 1976. For individual papers selected by ATRIS see subject area 07, records 172754 through 172758, Bulletin 7801.

Advisory Group for Aerospace Res & Dev-NATO No. 80, Jan. 1977, 316 pp

ACKNOWLEDGMENT: EI
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01 172759
INTERCITY VTOL AIRCRAFT--A HAWKER SIDDELEY REVIEW
A short history to date is given of the work carried out on civil V/STOL aircraft. The outstanding and unique characteristics of the V/STOL transport system work are restated. Finally, it is indicated that a VTOL aircraft could be a minimum energy answer to this transport problem.

Brennan, MJ (Hawker Siddeley Aviation Limited) *Vertica* Vol. 1 No. 1, 1976, pp 75-88, 11 Ref.

ACKNOWLEDGMENT: EI
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01 172763
EUROPE'S AIRBUS--THE WORLD'S QUIETEST AND MOST FUEL EFFICIENT WIDE-BODIED AIRLINER
The versatile Airbus is flying in airline service on the world's most advanced sub-sonic civil aircraft wing. Designed and manufactured in Britain by Hawker Siddeley Aviation, the wing is already providing Airbus operators with the economic benefits of supercritical aerodynamic technology that other manufacturers are promising for future designs. The article discusses general aspects of the overall design, and of the wing in particular.

Engineering Vol. 216 No. 9, Sept. 1976, pp 636-638

ACKNOWLEDGMENT: EI
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01 172769
PREDICTION OF BEHAVIOR IN CASE OF FORCED LANDING ON LAND AND SEA [Prevision du comportement a l'amerrissage et a l'atterrissage force]
The paper deals with catapulted free-flight models of aircraft used in the design phase of a project as a prediction tool of the crash and ditching behavior of a full-scale aircraft. Similarity laws used for the dynamics of the airframe and the structural representation are given. A typical ditching test model is described. [French.]

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefford, Norway, 31 May-3 June 1976.

Durriez, F
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper 16, Jan. 1977, 6 pp, 5 Ref.

ACKNOWLEDGMENT: EI
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01 172772
MAN-POWERED FLIGHT--A HISTORY AND A PROPOSAL
This paper on man-powered flight is a research report regarding the feasibility of the development of a man-powered flying machine for the sport aviation market. Man-powered aircraft of the past are examined and studied for their various strong points and, based on these experiences and on innovations being developed, the author suggests what he believes to be the optimum layout of a man-powered aircraft for sport aviation. In addition, the cost and flying considerations of the aircraft are discussed.

Stonier, JR (Kenting Earth Science Limited) *Canadian Aeronautics and Space Journal* Vol. 22 No. 6, Nov. 1976, pp 314-328, 9 Ref.

ACKNOWLEDGMENT: EI
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01 172773
COMPUTER-AUGMENTED PRELIMINARY DESIGN OF AIRCRAFT WING STRUCTURES
A computer system to aid in the preliminary design of aircraft wing structures for minimum weight is described. The system was developed to utilize effectively the best attributes of both computers and the human mind in the iterative process of analyzing highly redundant trial structures and using these results to select new trial strucutres. The computer is used for the routine data processing, and the designer performs those tasks which require judgement and intuition. Cathode ray tube graphical displays are provided for checking input data and for evaluating results. From given basic information on the wing structure loads, and material properties, a finite element model is developed, analyzed, modified to eliminate violations of design criteria, and optimized to obtain the structural configuration of least weight. The optimization proceeds automatically but the designer may monitor progress with the aid of tabular and graphical displays and modify the direction in which the optimization is proceeding.

Lewis, ADM (Purdue University) Tiewtranon, P Malone, DW *Computers and Structures* Vol. 6 No. 6, Dec. 1976, pp 557-561, 4 Ref.

ACKNOWLEDGMENT: EI
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01 172776
OPTICAL COMMUNICATION SYSTEMS FOR AIRCRAFT [Systemes de communications optiques a bord d'avions]
For optical fiber transmissions aboard aircraft, the use of LED emitters and PIN silicon photodiodes seems indicated. They would be connected by a bundle of medium loss (approximately 100 dB/km) fibers. Multiplexed exchanges would be assured by the use of a central coupler which readily permits the connection of the number of terminals required in such applications. Advances in the field of short distance transmission on optical fibers have been so rapid that it is possible to plan now for the on-board installtion of certain types of optical links. A comparison with the characteristics of electrical data bus systems as defined by existing standards shows that an optical fiber distribution system would perform at least as well as a electrical one. In view of their potential advantages from the point of view of security as well as with regard to their relative case of realization, one is led to the conclusion that optical transmission systems will very probably replace on-board electrical links in the future. [French]

Hawkes, TA Reymond, JC *Onde Electrique* Vol. 56 No. 12, Dec. 1976, pp 589-596, 24 Ref.

ACKNOWLEDGMENT: EI
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01 172777
INTERFERENCE BETWEEN A ROTOR AND WING OF A HELICOPTER [Interferencja miedzy wirnikiem i skrzydlem smiglowca]
A method for the estimation of a mutual interaction of the rotor and an auxiliary wing treated as an integral lift system of helicopter is presented. The interference between the lift elements mentioned above occurs in a form of the mutual disturbances of a medium caused by a resultant system of helicopter and wing wakes in the planes of these elements. The result of the solution of the interference balance of the system or disturbance of velocity field in an arbitrary control region. [Polish]

Szumanski, K (Institute Lotnictwa, Poland) *Rozprawy Inzynierskie/Engineering Transactions* Vol. 24 No. 2, 1976, pp 211-252, 31 Ref.

ACKNOWLEDGMENT: EI
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01 172780
STUDY OF COMMUTER AIRCRAFT DESIGN
This paper investigates the impact of configuration considerations, mission requirements, and performance constraints on conceptual commuter aircraft designs. Emphasis is placed on direct comparisons between turbofan and turboprop powered aircraft in the 10-30 passenger class. The analysis is accomplished using a computerized aircraft synthesis model that stimulates the aircraft design and mission. The resulting conceptual aircraft are similar in size and performance regardless of engine type but the turboprop offers more mission flexibility.

Galloway, TL (Ames Research Center)
American Society of Mechanical Engineers Preprint ASME 77-GT-36, 1977, 12 pp, 7 Ref.

ACKNOWLEDGMENT: EI
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01 172783
DESIGN, DEVELOPMENT AND MANUFACTURE OF A MODERN HELICOPTER
This paper describes the background to the conception of the Westland Lynx helicopter and its development into production. The intention is to provide a very general picture of the processes surrounding the design conception of a new helicopter and then to particularize on certain advanced technological features incorporated in the final design. Among the particular design features discussed are the rotor and conformal gearing.

Speechley, J (Westland Helicopters Limited) *Production Engineer* Vol. 56 No. 3, Mar. 1977, pp 29-33

ACKNOWLEDGMENT: EI
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01 172784
LANDING ON AIR
The Air Cushion Landing System (ACLS) is based on the ground effect principle in which a stratum of air, instead of wheels, is used as the aircraft

ground contacting medium. The ACLS employs a large expandable tube which encircles the bottom of the fuselage providing both an air duct and seal for the air cushion. The bottom of the tube (trunk) contains more than 6700 nozzle holes through which low pressure air passes into the air cushion cavity. The air source for the system is an onboard auxiliary turbine driven fan supplying a low pressure (about 1 psig) within the cushion cavity which produces a force equal to the vehicle's weight.

Automotive Engineering Vol. 85 No. 1, Jan. 1977, pp 30-32

ACKNOWLEDGMENT: EI
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01 172788
DESIGN CONSIDERATIONS FOR A V/STOL TECHNOLOGY AIRPLANE

A high speed two-engine three-fan V/STOL airplane was designed to demonstrate and develop the technology for operational V/STOL aircraft having safe engine-out characteristics. Engine-out requirements, integration of propulsion and aerodynamic controls, and propulsion installation are the major factors affecting the configuration. Use of variable pitch fans enhances the control system providing a responsive and versatile airplane.

Zabinsky, JM (Boeing Military Airplane Division) Burnham, RM *Journal of Aircraft* Vol. 13 No. 10, Oct. 1976, pp 745-747, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 172790
NEW ROLE FOR STRUCTURES TECHNOLOGY IN AIRCRAFT CONFIGURATION DEVELOPMENT

An automated structural design process capable of dealing with practical structures can produce timely analyses which recognize the sometimes conflicting influence of structural efficiency and performance goals. Examples are presented showing structural trade studies conducted on both subsonic and supersonic configurations. These results show the influence of external aeroelastic loads, of strength and durability design, of minimum gage constraints, and of stiffness requirements based on flutter analysis. The need for a finite element representation of low aspect ratio supersonic wings is shown.

Prepared for ASME Meeting, December 5, 1976.

Nisbet, JW (Boeing Company) Hoy, JM
American Society of Mechanical Engineers Preprint ASME 76-WA/AERO-8, 1976, 7 pp

ACKNOWLEDGMENT: EI
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01 172791
SIMPLIFIED METHOD OF FLIGHT TEST TECHNIQUES FOR THE DETERMINATION OF THE RANGE PERFORMANCE OF JET AIRCRAFT [Ein Vereinfachtes Flugversuchstechnisches Verfahren zur Ermittlung der Horizontalflugleistungen von Strahlflugseugen]

From the physical fundamentals of the known W/delta-method, a simplified method is derived to determine the range performance of jet aircraft. The theoretical background is provided. The flight test parameters which are to be measured result from the developed equations. The simplicity of the method, which under certain conditions is also applicable to aircraft with multi-shaft engines, results from a special plotting of the data. [German]

Rosenberg, R *Zeitschrift fuer Flugwissenschaften* Vol. 24 No. 6, Nov. 1976, pp 350-356

ACKNOWLEDGMENT: EI
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01 172795
ADVANCED SHORT HAUL AIRCRAFT FOR HIGH DENSITY MARKETS

The short haul (less than 500 miles) passenger enplanements represent about 50% of the total domestic enplanements. These can be distinguished by the annual passenger flow for a given city pair and classified into low, medium, and high-density markets. NASA studies have investigated various advanced short haul aircraft concepts that have potential application in these market areas. Although advanced operational techniques impact all market densities, advanced vehicle design concepts such as RTOL, STOL, and VTOL have the largest impact in the high density markets. The results of NASA-sponsored high-density short haul air transportation systems studies are summarized, and NASA-sponsored advanced VTOL conceptual aircraft design studies are reviewed. Trends in vehicle characteristics and operational requirements are indicated in addition to economic suitability and impact on the community.

Galloway, TL (Ames Research Center) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 15-34, 16 Ref.

ACKNOWLEDGMENT: EI
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01 172796
SHORT HAUL TRANSPORT SYSTEMS ARE AIRCRAFT TECHNOLOGY

Short-haul air transport and advanced aircraft are discussed for two categories of traffic: low/medium density, and high density. Summaries are presented of studies of low wing loading aircraft with active controls suitable for the low/medium density routes with short stage lengths and of propulsive-lift aircraft suitable for higher density routes. In the first case, the optimum characteristics of aircraft sized for 20-70 passengers include active controls for ride quality and gust alleviation; turboprop propulsion offers significant cost and fuel saving with no appreciable block time penalty for short typical stage lengths (on the order of 150 miles). In the high-density field, high bypass-ratio fan-powered aircraft with design cruise speed of 0.7-0.75 M and range capability of 1500 miles, are considered to be optimum. In both short-haul categories, the prop fan (or multi-bladed unshrouded fan) is a very interesting possible alternate, because the optimum speeds for short-haul stage lengths are lower than for long-haul aircraft. It is recommended that the following technologies be continued in development to the point they can be incorporated in project design of transport aircraft with acceptable low economic risk: propulsive lift, active controls for ride quality and load alleviation, composite structure, and advanced propulsion.

Sweet, HS (Lockheed-Georgia Company) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 35-52, 18 Ref.

ACKNOWLEDGMENT: EI
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01 172799
ADVANCED SUPERSONIC CRUISE AIRCRAFT TECHNOLOGY

The article presents a multi-discipline approach to the application of the latest technology to supersonic cruise aircraft concept definition, identifies current problem areas, and cites developing technology, in several disciplines, which are prospective solutions to these problems. Approach, status, and potential for improvement are addressed through consideration of a Langley Research Center (LRC) concepted supersonic cruise configuration (based on technology developed since 1969) and several parametric variations. As part of the developing technology, a recently developed aircraft sizing and performance computer program now makes possible rapid analysis of the effects of configuration resizing such as changes in wing loading and thrust-to-weight ratio. This program was used to determine allowable wing loading and takeoff gross weight sensitivity to structural weight reduction. Based on scale model tests of coannular nozzles, noise suppression on the order of that required for the configurations considered here can be achieved.

Baber, HT, Jr (Langley Research Center) Driver, C *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 111-129, 8 Ref.

ACKNOWLEDGMENT: EI
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01 172800
ADVANCED SUPERSONIC TRANSPORT: WHAT IT IS AND HOW IT COMPARES

Data are presented that can be used for planning development of a second generation near term supersonic transport. The capabilities of a design, in terms of range, speed, noise, and class of service, are presented. The technical development testing already accomplished to substantiate the advancements in airplane design is discussed. A comparison of the operating costs and income projected for an Advanced Supersonic Transport is presented and compared with projected costs and incomes of DC-10 type subsonic operations. Some data are presented on the early results of Concorde experience in capturing, for higher fares, those passengers who today patronize the full fare economy section. An attempt is made to summarize

what this can mean to the aircraft industry, to the airlines, and to the traveling public.

Fitzsimmons, RD (McDonnell Douglas Corporation) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 131-143, 16 Ref.

ACKNOWLEDGMENT: EI
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01 172801
RATIONALE FOR A SECOND-GENERATION SUPERSONIC TRANSPORT
The paper identifies an advanced technology supersonic transport that could be available for commercial service in the 1993 time period. It is estimated that this concept could lead to a configuration that would make possible airline operations with operating cost equal to that of the current widebody jets in service today. This airplane will meet all present-day ecological requirements regarding noise and emissions.

Wright, BR (Lockheed-California Company) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 145-162, 3 Ref.

ACKNOWLEDGMENT: EI
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01 172802
OVERLAND SUPERSONIC TRANSPORT WITH LOW SONIC BOOM--A FEASIBILITY STUDY
Recent ideas on the possibilities of supersonic flight without significant sonic boom are reviewed in the context of application to a large supersonic airliner. The idea of a third-generation supersonic transport designed for overland operation at Mach numbers greater than two without sonic boom annoyance and derived from a second-generation conventional overwater supersonic transport is introduced. The derivative airplane would share a common propulsion system, major features and subsystems, and would exploit the same technology base. It would require the addition of a large wing glove at the wing leading-edge inboard and substantial changes to the fuselage. An airplane designed for coast to coast flight across the United States would not need as large a takeoff gross weight as its intercontinental parent, but the effeiciency of the airplane would be reduced because of design compromises necessary to reduce sonic boom substantially.

Sigalla, A (Boeing Company) Runyan, LJ Kane, EJ *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 163-179, 21 Ref.

ACKNOWLEDGMENT: EI
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01 172808
NEW ALUMINUM AIRCRAFT ALLOYS FOR THE 1980'S [Nuovo leghe aeronautiche di alluminio per il 1980]
The paper was presented at the Torino International Meeting on Aluminum Alloys in the Aircraft Industries (October 1-2, develop an improved 2000-series alloy possessing an 8% increase in tension ultimate strength compared to 2024-T351, and a 7000-series alloy with an 11% increase in compression yield strength compared to 7075-T651. The alloy development studies which led to the current program are summarized. These studies examined the effects of Zn/Mg ratio, copper content, purity level (0.01.25% Fe and Si), ratio, copper content, purity level (0.01-0.25% Fe and Si), grain refiners (Zr, Cr, and Mn), thermomechanical processing, and heat treatment on strength, fracture, toughness, and fatigue crack growth rates. [Italian]

Hyatt, V (Boeing Company) *Allumino* Vol. 46 No. 2, Feb. 1977, pp 81-100, 37 Ref.

ACKNOWLEDGMENT: EI
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01 172809
USE OF NON DESTRUCTIVE INSPECTION METHODS IN AIRCRAFT MAINTENANCE AND OVERHAUL
This article reviews the use of NDI at the Mascot base of Australia's Qantas airline company whose main fleet consists of Boeing 747 and 707 aircraft. NDI at this base is divided into routine overhaul dye penetrant/magnetic particle inspection and the more specialized radiography, ultrasonic and eddy current activities. Examples of typical inspections regularly used at Mascot are given, the established techniques are summarized, and some newer advanced techniques are described in detail. The latter include neutron radiography and crack monitoring by conductive paint.

MacLeod, RJ Brown, GE *Australasian Corrosion Engineering* Vol. 21 No. 1-2, Jan. 1977, pp 13-18

ACKNOWLEDGMENT: EI
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01 172818
EFFECTIVE MANAGEMENT OF IN-SERVICE DEFICIENCIES
In-service deficiencies can result in excessive aircraft out of service time, inefficient utilization of labor, higher than normal material consumption, and loss of aircraft utilization and revenue production. In order to ensure that this one element of the maintenance function is well controlled, a number of specific activities must be undertaken. The purpose of this paper is to describe the process and management technique used by Air Canada to ensure that in-service deficiencies do not jeopardize the operations.
Prepared for SAE Meeting, May 18-20, 1976.

Aubin, B (Air Canada)
Society of Automotive Engineers Preprint SAE 760515, 1976, 13 pp

ACKNOWLEDGMENT: EI
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01 172820
SOME ERGONOMIC ASPECTS OF COCKPIT PANEL DESIGN FOR AIRLINE AIRCRAFT
Whether designing a new panel, or evaluating one that has already been put together, a systematic and thorough human factor approach will pay off. The purpose of this paper is to provide general guidelines for this ergonomic exercise. It is not intended here to go into wider aspects of panel design such as instrument layout and design, or electrical techniques employed in panel construction. Ergonomic aspects of panel maintenance, though important, are also outside the scope of this short paper.

Hawkins, F *Shell Aviation News* Vol. 437 1976, pp 2-9, 21 Ref.

ACKNOWLEDGMENT: EI
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01 172822
TRENDS IN ENGINE DESIGN
The effects of fuel economy structures and of noise abatement requirements on aircraft engine design are considered. Prop fan and geared fan engines, heat exchanger engines, variable cycle engines, variable pitch turbofans, boundary layer propulsion systems and laminar flow control technology are all reviewed in brief.

Denning, RM (Rolls Royce Limited) Miller, SC Wright, G *Shell Aviation News* Vol. 436 1976, pp 28-31

ACKNOWLEDGMENT: EI
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01 173084
FEASIBILITY OF MODERN AIRSHIPS: PRELIMINARY ASSESSMENT
This paper gives a review of the Phase I portion of the NASA-sponsored "Feasibility Study of Modern Airships" . Phase I consisted of a historical survey, a screening of potential civil missions, a parametric definition of vehicle concepts, and an identification of vehicle/mission combinations deserving further study.

Ardema, MD (Ames Research Center) *Journal of Aircraft* Vol. 14 No. 11, Nov. 1977, pp 1140-48, 12 Ref.

ACKNOWLEDGMENT: EI
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01 173086
INTERACTION BETWEEN PLANE ELECTROHYDRODYNAMIC JETS
Special devices, known as active equalizers, have been developed as one of the methods to control the airplane electrification caused by the loss of charged particles through the engine. The functioning of these equalizers is based on feeding of charges of the opposite sign to the engine exhaust jet. It is in this context that the problem of interaction between oppositely charged jets arises. The need for evaluating interactions between similarly charged jets comes up in designing systems containing multiple equalizers when one must decide on their placement near the exhaust jet. In the present work, using numerical analysis, the interaction effects of two plane charged

jets is studied. The performance of two electric charge equalizers, as well as equalizers and aircraft engines is modeled.

Grabovskii, VI *Fluid Dynamics* Vol. 11 No. 6, Nov. 1976, pp 931-936, 9 Ref.

ACKNOWLEDGMENT: EI
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01 173087
OH FOR THE WINGS OF A--VARIABLE GEOMETRY BY VIRTUAL CENTRE

The article argues the case for variable wing geometry aircraft, i.e. aircraft whose planform can be adjusted in flight to give optimum performance in differing roles, as opposed to the majority, which can only perform one role effectively. It puts forward proposals for a wing suspension, designed to overcome the handicaps inherent in the method so far employed in mounting the wings of variable geometry aircraft. After discussing some of the problems involved, the article suggests an engineering design for a wing/fuselage joint with a virtual center of rotation. That is, that the center about which the wing pivots should be a purely theoretical point. The advantage of this is that the selection of this center would no longer be governed by any structural requirements, within very wide limits. In fact this center need not be within the aircraft outline. Selection of the point about which to swing the wing can be decided almost entirely on aerodynamic considerations. Three examples of the concept are discussed, along with engineering aspects and wing/fuselage sealing.

Bird, WJ (British Aircraft Corporation) *Chartered Mechanical Engineer* Vol. 24 No. 7, July 1977, pp 68-73

ACKNOWLEDGMENT: EI
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01 173088
OUTLOOK FOR SIMULATION OF FORWARD FLIGHT EFFECTS ON AIRCRAFT NOISE

This paper offers a wide-ranging examination of the fundamental issues behind recent efforts to devise means by which forward flight effects on aircraft noise may be simulated in ground-based facilities. Theoretical predictions of flight effects for simple configurations are noted, the advantages and disadvantages of various types of simulation facility are set out, and the features of possible noise sources and propagation mechanisms are tabulated. Opinions are then given as to how these sources and mechanisms may best be simulated, and the paper concludes with both general and very specific recommendations for future experimental and theoretical work.

Crighton, DG (Leeds University, England) Williams, JE Cheeseman, IC *Journal of Aircraft* Vol. 14 No. 11, Nov. 1977, pp 1117-25

ACKNOWLEDGMENT: EI
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01 173089
PACKAGING AIRCRAFT ENGINE INSTRUMENTS

Today's aircraft instruments offer improved performance and reliability in a smaller package size. The authors report how extensive use has been made of CMOS to reduce power, size and weight. The instruments described are based upon three aspects of design: solid-state signal processing, optoelectronic display format, and planned redundancy. Each instrument is packaged so that the P/C boards are readily accessible and can be placed on extension boards, resulting in a simplified servicing operation.

Kivenko, K Rauch, S *Electronic Packaging and Production* Vol. 17 No. 4, Apr. 1977, 3 pp

ACKNOWLEDGMENT: EI
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01 173094
SPECIAL COURSE ON CONCEPTS FOR DRAG REDUCTION

Proceedings includes 9 papers dealing with various means for reducing skin friction drag (e.g. compliant walls, boundary layer control, etc.), induced drag (e.g. winglets), interference drag, transonic shock wave drag (supercritical wings), and supersonic wave drag. In addition, the internal aerodynamics of ducting, especially diffusers, are dealt with. Individual papers are indexed separately.

Spec Course on Concepts for Drag Reduct, Von Karman Institute Rhode-St-Genese, Belgium, March 28-April 1, 1977.

AGARD Report Proceeding No. 654, June 1977, 300 pp
ACKNOWLEDGMENT: EI
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01 173481
APPLICATION OF ACTIVE CONTROLS TECHNOLOGY TO AIRCRAFT RIDE SMOOTHING

Prototype ride smoothing systems (RSS's) were synthesized for flight testing aboard the NASA general purpose airborne simulator (GPAS). The systems were designed to meet comprehensive criteria, including passenger comfort and aircraft handling qualities considerations. System performance estimates based on analytic expressions were compared to estimates derived from digital calculations. The effects of RSS's on pilot workload during instrument landing system (ILS) approach in turbulence was examined in a fixed-base simulator. A limited number of flights were conducted to verify predicted RSS performance. Results of these experiments indicate that the RSS's reduce pilot workload and increase passenger comfort, while maintaining handling qualities.

Jacobson, ID (Virginia University) Lapins, M *Journal of Aircraft* Vol. 14 No. 8, Aug. 1977, pp 775-781, 5 Ref.

ACKNOWLEDGMENT: EI
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01 173487
IMPROVED MANAGEMENT APPROACH TO UPGRADE AVIONIC SYSTEM RELIABILITY

An improved reliability management-approach for upgrading avionic system reliability is presented. Management of the program was by no means of an improvement control plan that included continuously updated field performance data, the improvements planned, and projections of the numerical reliability increase with the changes incorporated. The use of special teams working concurrently to improve design, parts, and manufacturing processes is discussed. Presented are measured field results that verify the effectiveness of these improvement efforts.

Klivans, LS (Hughes Aircraft Company) *IEEE Transactions on Reliability* Vol. R 26 No. 1, Apr. 1977, pp 23-28

ACKNOWLEDGMENT: EI
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01 173488
FUEL SUBSYSTEMS FOR LH/2 AIRCRAFT: R & D REQUIREMENTS

Design characteristics of the fuel subsystem for subsonic LH2 fueled commercial aircraft are discussed in terms of requirements and technology availability. Some of the differences between LH2 systems developed for space vehicles and those required for commercial aircraft are pointed out. Significant areas of technology requiring advancement and long lead time development testing are identified. The material presented in this paper reflects the results obtained from a Boeing study covering the development of a candidate fuel subsystem for a 3000 nautical mile range LH2 fueled commercial airplane.

Monenthy, AM (Boeing Company) *International Journal of Hydrogen Energy* Vol. 2 No. 2, 1977, pp 155-162

ACKNOWLEDGMENT: EI
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01 173493
SELECTION OF SPRAY NOZZLE AND ITS OPERATING REGIMES FOR REMOVING ICE DEPOSITS, FROST, AND FROZEN-ON SNOW FROM AIRPLANE SURFACES

For effective removal of ice deposits, frost, and snow from airplane surfaces at outside air temperatures down to minus 50 degree C it is advisable to use jet spray nozzles with a reduced length of the cylindrical insert or jet conical nozzles, while at outside air temperatures down to minus 25 degree to 30 degree C it is best to use jet conical spray nozzles with an increased length of the cylindrical insert. Optimum inner dimensions of spray nozzles and their optimum operating regimes are also established.

Moroshkin, MY Smolin, VN Skobel'tsyn, YA Komlev, AF *Soviet Aeronautics* Vol. 20 No. 1, 1977, pp 111-113, 1 Ref.

ACKNOWLEDGMENT: EI
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01 173703
AIRLINER PRICES GUIDE 1978
Average current prices for used airplanes have increased considerably due to a shortage of planes available for sale. The prices listed in this survey indicate trends and comparative values (but prices actually paid for individual planes may vary widely). Where possible the prices quoted here (in American dollars) are for half-time aircraft with half-time engines; newer aircraft may be much more expensive and older types much cheaper, particularly if structure modifications are expensive.

Sweetman, B *Flight International* Vol. 113 No. 3599, Mar. 1978, pp 700-703

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

01 173706
WORLD PRIVATE AIRCRAFT DIRECTORY
The majority of light aircraft currently in production through out the world are listed by type (sailplanes, motor gliders, single-seat single-engine, two/four seat single-engine up to 150 horse power, single-engine over 151 horse power, light twin-engine, and helicopters, along with their prices and specifications.

Moll, N *Flight International* Vol. 113 No. 3600, Mar. 1978, p 773

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

01 173709
GIANTS BATTLE IN US SMALL TURBINE MARKET
The specifications for some of the small turbine engines (both turbofan and turboprop) currently on the market are given. The article includes engines intended for fixed wing aircraft, helicopters, commercial aircraft, military aircraft, and large business aircraft. Also included are figures indicating each major manufacturer's share of the small turbine engine market in recent years and projections for future years.

Geddes, JP *Interavia* Vol. 33 Mar. 1978, pp 179-184, Tabs.

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

01 173822
THE CONCORDE COMPROMISE: THE POLITICS OF DECISION-MAKING
The Carter Administration's decision in September 1977 allowed for only 16 production models of Concorde to have access to 13 designated entry points. Any Concordes built in the future are expected to meet stringent FAA noise standards which the current models can not now satisfy. The American decision on the Concorde is viewed as a highly political compromise. The compromise is between the interests of the major U.S. aerospace companies who are determined to maintain American control of the non-communist world's aerospace manufacturing operations and the judgement of those in the White House who seek a mutually satisfactory accommodation with European governments and aerospace interest. Opposition to the SST concept has been weakened considerably, largely because American environmentalist have relied heavily on the issue of noise emission rather than stratospheric environmental consequencies of SST operations. The important economic and environmental issues which still persist include: The problematic implications of European demands for technological and economic policy vis a vis the U.S.; the need to affirm the Western World's commitment to resource conserving not resource-depleting technologies; and the possibilities that future SST aircraft might damage the ozone layer. It remains imperative that environmental groups throughout the Western world mobilize support for a complete environmental impact statement on the Concorde before commitments are made that cannot be reversed.

Ross, D *Bulletin of the Atomic Scientists* Vol. 34 No. 3, Mar. 1978, pp 46-53

ACKNOWLEDGMENT: Bulletin of the Atomic Scientists
ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

01 174010
1978 AIRCRAFT
1978 aircraft and helicopter trends, costs, models, and comparisons are presented in this article. In general, 1978 aircraft prices have risen 10% over 1977 prices. The average single engine aircraft will cost 8.4% more this year than last. With both jets and helicopters, prices have generally risen 15% to 20%. But when viewed in terms of aircraft capabilities offered for the money, the 1978 dollar provides more. Subtle improvements in cost and capabilities at a price have made aircraft selection an extremely complex task. In higher performance aircraft as well, performance numbers and capabilities are rising making it more difficult to make a decision. The following aircraft models are reviewed: single-engine, multi-engine piston, multi-engine turbocharged, piston engine pressurized, turboprop, and turbojet/turbofan. The real restraints on the helicopter industry in 1978 will be from manufacturing limitations and government regulation rather than from any primary market pressures. Several trends are developing in the market place which will shape the industry for the next decade. Emphasis on operational cost reductions will continue. Rotor blades, hubs, transmission and all other dynamic parts will become more durable. Rising acquisition costs will severely squeeze the smaller operator and accelerate the trend toward larger commercial heilcopter operating companies. Increased competition will provide buyers with a larger selection of models, requiring greater care in purchasing decisions. Expanded government involvement by FAA, OSHA and the courts. Lastly, an urgent need for public-use heliports will continue. The following helicopter models are reviewed: Piston helicopters, single-engine turbine, and multi-engine turbine.

Business and Commercial Aviation Magazine Vol. 42 No. 4, Apr. 1978, pp 51-97, Tabs., Phots.

ACKNOWLEDGMENT: Ziff-Davis Publishing Company
ORDER FROM: Ziff-Davis Publishing Company, 1 Park Avenue, New York, New York, 10016

01 174012
1978 AVIONICS
A list of current avionics equipment is described in this section. Navigational equipment include Automatic Direction Finders, Long-Range Navigation Systems, RNAV System, VHF Panel-Mounted Nav Receivers and remote-mounted receivers. Communications equipment include the airborne telephone system, HF Transceivers, VHF Panel and Remote Munted Nav Transceivers. Pulse systems equipment include distance measuring equipment transponders, and weather radar. Flight instrumentation includes the Encoding Altimeters/Digitizers, Horizontal Situation Indicators/ Compass Systems and Radio Altimeters. Flight control systems include the basic autopilot, Flight Director Systems, Integrated Autopilot/FD Systems, Avionics Management Systems, Centralized Control Systems, Frequency Management Systems and the ARINC Form Factor.

Business and Commercial Aviation Magazine Vol. 42 No. 4, Apr. 1978, pp 105-187, Tabs., Phots.

ACKNOWLEDGMENT: Ziff-Davis Publishing Company
ORDER FROM: Ziff-Davis Publishing Company, 1 Park Avenue, New York, New York, 10016

01 174307
AERODYNAMIC COUPLING BETWEEN LATERAL AND LONGITUDINAL DEGREES OF FREEDOM
An oscillatory technique for routine measurement of the direct, cross, and cross-coupling moment derivatives due to pitching and yawing has been developed and a series of comprehensive results at Mach numbers 0.7 and 0.25 and at angles of attack up to 40 deg has been obtained in a large wind tunnel. It was found that some of the dynamic cross-coupling derivatives, which at low angles of attack were all insignificant, at higher angles of attack could reach values that rendered the pertinent cross-coupling terms in the equations of motion comparable in magnitude to the well-established damping terms. This applied in particular to results obtained at Mach number 0.7. Large nonlinear variations with angle of attack were observed in many of the measured derivatives including the important damping-in-pitch and damping-in-yaw derivatives. It was concluded that it may be desirable to include certain dynamic cross-coupling derivatives in the equations of motion, and to consider all of these equations simultaneously, rather than in separate longitudinal and lateral groups.

Orlik-Rueckemann, KJ (National Research Council of Canada) *AIAA Journal* Vol. 15 No. 12, Dec. 1977, pp 1792-99, 11 Ref.

ACKNOWLEDGMENT: EI
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01 174308
AIRCRAFT ENGINE CLEANING
This report presents a few of the problems encountered in gas turbine cleaning and discusses methods used to remove contaminants. Titanium alloys were very sensitive to the method used for cleaning. Without proper balance and selection of the cleaning materials, catastrophic failures can occur in the field from hydrogen embrittlement or similar problems. Nickel alloys seen more able to withstand cleaning solutions so long as residues from cleaning operations are not left on the parts after the engine is put into service.

Corrosion 77, Intl Corrosion Forum Devoted Exclusively to the Protection and Performance of Materials, San Francisco, California, 14-18 March 1977.

Manty, BA (Pratt and Whitney Aircraft)
National Association of Corrosion Engineers Proceeding Paper 75, 1977, 75 pp

ACKNOWLEDGMENT: EI
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01 174309
AIRCRAFT INTERIOR SANDWICH PANEL DEVELOPMENT
The objective of this program is to select a sandwich panel-decorative film system that possesses both improved FS&T characteristics and acceptable cost, processing requirements, decorative capability, abrasion resistance, stain resistance, scuff resistance, and washability. The selected system is to be based on current state-of-the-art materials. Three resin systems (viz., bismaleimide, polyimide, and modified phenolic) and four decorative films were evaluated. One resin system (modified phenolic) and one decorative film (Tedlar-polycarbonate) were selected after a screening phase for incorporation into a final evaluation phase. The final phase covers development of an overall ranking system for each of the sandwich panels. Some of the characteristics relevant to this ranking are smoke release, heat release, cost, mechanical strength, and toxic gas production.

Anderson, RA (Boeing Company) Johnson, GA *Journal of Fire and Flammability* Vol. 8 No. 3, July 1977, pp 364-381, 7 Ref.

ACKNOWLEDGMENT: EI
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01 174310
AMERICAN AIRLINES ENGINE MANAGEMENT PROGRAM
In 1967 American Airlines switched from a Time Between Overhaul maintenance program to a Condition Monitored Maintenance program. Under this program, the engine life cycle is fully controlled by monitoring in-service performance and by a B-O-W (Bill-of-Work) control system for each engine on an individualized basis. Engine manufacturer recommended and FAA approved disc life limits prevail. Where experience or regulations indicate a requirement, life or run time limits are imposed on a given part or assembly or engine or special maintenance action. An Engine Working Group (EWG) functions for each engine. The EWG arrives at decisions by agreeing unanimously on modifications and their schedule of incorporation, build standards or the solution of any problem that would prevent the engine from achieving its objectives--material cost, manhours per build, reliability, fuel consumption. The basic engine gas path parameter trend plots are computer generated, using data recorded by the Flight Engineer and teletyped directly to the computer. The trend plots are reviewed daily by qualified engineers for incipient failures.

Wollmershauser, C (American Airlines Maintenance & Eng Center) *Shell Aviation News* No. 442, 1977, pp 6-11

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 174313
BELL MODEL 222
The Model 222 was designed to meet the needs of the worldwide commercial market. Primary design objectives were safety, efficiency, reduced cost of ownership, and superior handling qualities. From the test results the Model 222 is a fuel conservative, productive aircraft with excellent flying qualities. The 222 far exceeds the FAA requirements for fail-safe design and crashworthiness. Redundancy, 8g seats, crash resistant fuel tanks, and real twin-engine safety are examples. The latter refers to the fact that for any altitude at which the helicopter can hover OGE, it can continue to cruise if one engine fails. The aircraft will be delivered in early 1979 after the most comprehensive test program ever conducted on a commercial helicopter.

Prepared for SAE Meeting, November 14-17, 1977.
Garrison, JR (Bell Helicopter Textron) Waldrup, HH
Society of Automotive Engineers Preprint SAE 770951, 1977, 16 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 174316
CORROSION PROTECTION SYSTEM FOR BERYLLIUM IN AIRCRAFT BRAKE APPLICATIONS
The corrosion resistance of Glidden's Glid-Guard Silicone Hi-Temp Primer paint and the protection afforded to the beryllium substrate in salt-water environments is excellent and the primer (and perhaps other similar paints) should be a viable coating for use on beryllium brakes in aircraft applications. Manganese is anodic to beryllium in 5% salt fog, 3.5% NaCl solution, and in Cleveland tap water. The electroplating of manganese onto the 4130 steel carrier plates (for sintered iron friction pads) appears to be a viable approach to eliminate the pitting-type galvanic corrosion observed on some F-14 brakes. Other materials in contact with the beryllium (such as titanium) presumably could also be plated with manganese. The managanese plate has little effect on the mechanical properties of the steel substrate, even after a thermal treatment of 1 hour at 982 degree C.

Corrosion 77, Intl Corrosion Forum Devoted Exclusively to the Protection and Performance of Materials, San Francisco, Calfornia, March 14-18, 1977.

Paine, RM (Brush Wellman Incorporated) Stonehouse, AJ
National Association of Corrosion Engineers Proceeding Paper 26, 1977, 26 pp, 1 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 174317
COST-EFFECTIVE BUILT-IN TEST FOR ADVANCED AIRCRAFT ELECTRICAL SYSTEMS
This paper presents a method for utilizing the data handling portion of the Advanced Aircraft Electrical System (AAES) to provide a cost-effective built-in test capability to isolate faults to the line replaceable unit (LRU). The evolved techniques provide a means for determining the health of each of the 2048 input and 2048 output controls (signal transducers and power switches) that are multiplexed by the system. The system also automatically tests the integrity of all the aircraft electrical distribution system signal and power wire, terminations, and connector pins. Four techniques to automatically test the data handling and multiplex circuits are also discussed.

Perkins, JR (Vought Corporation) Jones, JL *Journal of Aircraft* Vol. 14 No. 12, Dec. 1977, pp 1221-25, 7 Ref.

ACKNOWLEDGMENT: EI
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01 174320
EVALUATION OF AIRCRAFT BRAKE MATERIALS
A test program was carried out to evaluate several new high-temperature friction materials for use in aircraft disk brakes. A specially built test apparatus utilizing a disk brake and wheel half from a small jet aircraft was used. The apparatus enabled control of brake pressure, velocity and braking time. Tests were run under both constant and variable velocity conditions and covered a kinetic energy range similar to that encountered in aircraft brake service. The materials evaluation showed that two newly developed friction materials show potential for use in aircraft disk brakes. One of the materials is a nickel-based sintered composite, while the other is a molybdenum-based material. Both materials show much lower wear rates than conventional copper-based materials and are better able to withstand the high temperatures encountered during braking. Additional materials improvement is necessary, however, since both materials show a significant negative slope of the friction-velocity curve at low velocities.

ASLE/ASME Lubricating Conference, Kansas City, Missouri, 3-5 October 1977.

Ho, TL (Rensselaer Polytechnic Institute) Kennedy, FE Peterson, MB
American Society of Lubricating Engineers Preprint 77-LC-6B-2, 1977, 7 pp

ACKNOWLEDGMENT: EI
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01 174322
FUTURE OF ROTORCRAFT IN AVIATION
The article discusses possible improvements to rotors of conventional helicopters and considers features of future helicopter designs, including the supersonic rotor helicopter, helicopter with the tilt (wing) rotor, and remotely piloted helicopters.

Anglo-American Aeronautical Conference, 15th, London, England, 31 May-2 June 1977.

Jones, JP (Westland Helicopters Limited)
Royal Aeronautical Society Proceeding 1977, 15 pp, 1 Ref.

ACKNOWLEDGMENT: EI
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01 174324
LASER OPTICAL MEASUREMENT METHODS FOR AERO ENGINE RESEARCH AND DEVELOPMENT
Proceedings includes 6 papers on the various optical measuring methods, most of which use laser beams, such as laser velocimetry, Raman scattering, and holography interferometry, for determining flow velocity (with turbulence and fluctuations), temperature, and species concentration. The application of these methods to flow velocity measurements in solving aircraft engine propulsion problems is discussed in detail. Selected papers are indexed separately.

AGARD Lecture Series No. 90 presented at Trenton, NJ, 25-26 August 1977; London, England, 30-31 August 1977, and Urbino, Italy, 5-6 September 1977.

Advisory Group for Aerospace Res & Dev-NATO Lecture Series 90, July 1976, 166 pp

ACKNOWLEDGMENT: EI
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01 174325
LIFT/CRUISE FAN VTOL AIRCRAFT
The lift/cruise fan represents one of several aircraft design approaches being considered to achieve vertical takeoff and landing (VTOL) but also high subsonic cruise with a payload approaching what operational airplanes now yield. The concept calls for a high-bypass-ratio fan propulsion system to augment thrust for hovering flight and to give efficient thrust for hovering flight and to give efficient cruise. Two types of lift-fan propulsion system have been studied for operational VTOL aircraft: gas-coupled and mechanically coupled engines and fans. The gas-coupled system uses the hot gas from a gas generator to drive the fans through tip turbines on them. Fan speed controls thrust, and valving hot gas to the tip turbines controls fan speed. The mechanically coupled system interconnects fans and engines with high-speed shafting and gear boxes. It operates at constant fan speed, thrust being controlled by variable-pitch fan blades. A lift/cruise fan VTOL aircraft must use deflection to direct thrust for the various modes of flight, from hover to cruise. Two basic arrangements for deflecting thrust have been tested: fixed fan with thrust-deflecting nozzles, and tilting nacelle for completely rotating the fan. Both have been applied to VTOL design concepts.

Quigley, HC (Ames Research Center) Franklin, JA *Astronautics and Aeronautics* Vol. 15 No. 12, Dec. 1977, pp 32-37, 21 Ref.

ACKNOWLEDGMENT: EI
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01 174326
LED NUMERIC DISPLAY FOR THE AIRCRAFT COCKPIT
This paper describes the construction and performance of an LED numeric display designed specifically for aircraft cockpit applications. The display, using yellow or green LED chips, is a 4-character 7-bar numeric with 4-mm character height mounted in a hermetically sealed package to meet full military device specifications. Legibility studies are reported for this display in ambient illuminations up to 100,000 lux, using different, commercially available contrast-enhancement filters. The results show that the display is completely legible in the highest illumination for a relatively modest power consumption.

Tyte, RN (Royal Aircraft Establishment, England) Wharf, JH Ellis, B Kniff, TF O'Rourke, G Gibb, RM *SID Proceedings* Vol. 18 No. 2, 77, pp 198-202

ACKNOWLEDGMENT: EI
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01 174328
MULTIPLE CONTROL INPUT DESIGN FOR IDENTIFICATION OF LIGHT AIRCRAFT
A design technique is presented for control input histories resulting in higher confidence levels in the estimate of lateral stability and control derivatives of light aircraft, and which cause dynamic motion favorable to reductions in numerical divergence tendencies in the identification algorithms. A combined aileron and rudder input design is demonstrated for the Cessna 172 aircraft.

Wells, WR (Wright State University) Ramachandran, S *IEEE Transactions on Automatic Control* Vol. AC-2 No. 6, Dec. 1977, pp 985-987, 7 Ref.

ACKNOWLEDGMENT: EI
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01 174329
OXIDATIVE PYROLYSIS OF AIRCRAFT INTERIOR MATERIALS
Thirteen aircraft interior materials were thermally decomposed using a combustion tube furnace. The thermal degradation products were analyzed for HCN, H2S, HCl, and HCHO by polarography; NO2 and SO2 by spectrophotometry; HF by potentiometry; and CO by NDIR. Parametric studies were conducted to characterize the effects of oxygen availability, airflow rate, and temperature on gas yields. These materials were also tested under flaming conditions in the NBS smoke chamber, and the same 8 gases were measured using identical analytical procedures. The gas yields obtained by the two test methods have been compared by calculating the coefficients of correlation.

Spurgeon, JC (National Aviation Facilities Experimental Center) Speitel, LC Feher, RE *Journal of Fire and Flammability* Vol. 8 No. 3, July 1977, pp 349-363, 11 Ref.

ACKNOWLEDGMENT: EI
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01 174332
ROTARY CYLINDER SPREADER FOR AIRCRAFT GRANULAR APPLICATIONS
The objective of the study described was to compare the performance of a conventional ram-air spreader and a rotary cylinder spreader for low application rates of granular materials. Tests included an examination of the effects of particle size on distribution patterns from these spreaders.

Lee, KC (Auckland University, New Zealand) Yates, WE *ASAE Transactions* Vol. 20 No. 5, Sept. 1977, pp 801-805, 7 Ref.

ACKNOWLEDGMENT: EI
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01 174334
SPRAY DEPOSIT SAMPLING TECHNIQUE TO EVALUATE ELECTROSTATIC AERIAL SPRAY-CHARGING
The electrostatic charging of agricultural chemical sprays applied by aircraft offers theoretical advantages that are urgently needed by the aerial application industry. Research on equipment and methodology for aerial electrostatic spray-charging has resulted in a need for ground-based assessment equipment for evaluation of the electrostatic charging of aerial sprays. The paper reports on an electronic, buffer amplifier circuit that was designed, developed and field tested to evaluate electrostatic charging of aerial sprays. The circuit was designed to detect the passage of an electrostatically-charged aircraft; the falling of charged-particle, spray-cloud plumes; and the spray charge deposited upon a sphere.

ASAE Annual Meeting, NC State University, Raleigh, North Carolina, 26-29 June 1977.

Carlton, JB (Texas A&M University) Bouse, LF
American Society of Agricultural Engineers Proceeding 1977, 16 pp

ACKNOWLEDGMENT: EI
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01 174336
STUDY OF PARAMETERS WHICH AFFECT CORROSION BETWEEN SOLID FILM LUBRICANTS AND AIRCRAFT ALLOYS
This paper summarizes the findings of a program demonstrating how parameters such as humidity, surface pretreatment, inhibitors, SO2/salt

ratio, environment, etc., affect corrosion between solid film lubricants and various aircraft alloys. It was found that burnishing the surface of a solid film lubricant causes rapid loss of corrosion protection. The reason for this could be that the MoS2 particles are pressed closer together and become more of the conductor. If this is true, it would mean that a lubricant does not have to contain graphite to cause galvanic corrosion when involved in a dissimilar metal couple. Pretreatments were found to have less effect than expected on corrosion prevention. Humidity was found to have no effect on wear life or corrosion rate.

Gabel, MK (Naval Air Development Center) Peterson, MB *Lubrication Engineer* Vol. 33 No. 12, Dec. 1977, pp 644-649, 9 Ref.

ACKNOWLEDGMENT: EI
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01 174337
TURBULENT WAKE BEHIND SLENDER PROPELLER-DRIVEN BODIES AT ANGLE OF ATTACK
Several previously unstudied effects on the turbulent wake of propeller-driven bodies are examined. The first is the effect of body pitch angle on the wake properties. The second is the addition of an appendage such as a "sail" to an axisymmetric body. The third is the effect of replacing a single propeller by an equivalent set of side-by-side, counter-rotating propellers.

Schetz, JA (Virginia Polytechnic Institute & State University) Daffan, EB Jakubowski, AK *AIAA Journal* Vol. 16 No. 1, Jan. 1978, pp 6-7, 6 Ref.

ACKNOWLEDGMENT: EI
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01 174338
UNSTEADY AIRLOADS IN SEPARATED AND TRANSONIC FLOW
Proceedings includes 18 papers dealing with two groups of problems. The first group covers airframe response to separated flow and is concerned with the prediction and description of the separated flow environment and the essential effects of airframe response on individual aircraft components. The second group, aimed at transonic unsteady aerodynamics for elastic phenomena, is focused at flutter, aeroelastic instabilities, and other static and dynamic aeroelastic problems for which margins of safety are least in the transonic speed range and which is consequently the most critical speed regime. Selected papers are indexed separately.

AGARD Conf Proceeding, Unsteady Airloads in Sep and Transonic Flow, presented at the meeting of the AGARD Struct and Mater Panel, 44th, Lisbon, Portugal, 19-20 April 1977.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 226, 1977, 286 pp

ACKNOWLEDGMENT: EI
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01 174483
A METHODOLOGY FOR ESTIMATING THE ECONOMIC BENEFITS OF AN AIRCRAFT ENGINE WARRANTY
Aircraft engine warranties are used extensively in the commercial airlines industry. If the Department of Defense hopes to use warranties as a method of reducing engine life cycle costs, the costs and benefits of each warranty must be carefully analyzed. The methodology developed in this study provides framework to assist analysts in estimating the economic benefits of an engine warranty. A test application of the methodology details the benefits of a hypothetical DOD engine warranty, and includes a sensitivity analysis of the key variables. The study concludes that the basic method can be used to estimate the economic benefits of a wide range of engine and equipment warranties. (Author)

Dooley, MP Kells, RE
Air Force Institute of Technology MS Thesis AFIT-LSSR-10-77B, Sept. 1977, 135 pp

ACKNOWLEDGMENT: NTIS
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AD-A047282/9ST

01 174487
QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA, 1 JULY TO 30 SEPTEMBER 1977
Partial Contents: Hybrid Computer Models as an Aid in Design of Gas Turbine Control Systems for Helicopters; and On the Investigation of the Ram Air Effects on the Air Side Cooling System Performance of a North American Car.

Foreword in French.

National Research Council of Canada DME/NAE-1977(3), Sept. 1977, 74 pp

ACKNOWLEDGMENT: NTIS
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AD-A047361/1ST

01 174567
VORTEX INTERACTIONS AND DECAY IN AIRCRAFT WAKES
The dynamic interaction of aircraft wake vortices was investigated using both inviscid and viscous models. For the viscous model, a computer code was developed using a second-order closure model of turbulent transport. The phenomenon of vortex merging which results in the rapid aging of a vortex wake was examined in detail. It was shown that the redistribution of vorticity during merging results from both convective and diffusive mechanisms.

Bilanin, AJ Teske, ME Dupdonaldson, C Williamson, GG
Aeronautical Research Associates of Princeton, Inc Final Rpt. NASA-CR-2870, Sept. 1977, 121 pp

Contract NAS1-13939

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
N77-33105/6ST

01 174570
A FLIGHT INVESTIGATION OF THE WAKE TURBULENCE ALLEVIATION RESULTING FROM A FLAP CONFIGURATION CHANGE ON A B-747 AIRCRAFT
A flight test investigation was conducted to evaluate the effects of a flap configuration change on the vortex wake characteristics of a Boeing 747 (B-747) aircraft as measured by differences in upset response resulting from deliberate vortex encounters by a following Learjet aircraft and by direct measurement of the velocities in the wake. The flaps of the B-747 have a predominant effect on the wake. The normal landing flap configuration produces a strong vortex that is attenuated when the outboard flap segments are raised; however, extension of the landing gear at that point increases the vortex induced upsets. These effects are in general agreement with existing wind tunnel and flight data for the modified flap configuration.

Jacobsen, RA Short, BJ
Ames Research Center NASA-TM-73263, A-7116, July 1977, 45 pp

ACKNOWLEDGMENT: NTIS
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N77-33130/4ST

01 174575
BEHAVIOR OF AIRCRAFT ANTISKID BRAKING SYSTEMS ON DRY AND WET RUNWAY SURFACES: A SLIP-RATIO-CONTROLLED SYSTEM WITH GROUND SPEED REFERENCE FROM UNBRAKED NOSE WHEEL
An experimental investigation was conducted at the Langley aircraft landing loads and traction facility to study the braking and cornering response of a slip ratio controlled aircraft antiskid braking system with ground speed reference derived from an unbraked nose wheel. The investigation, conducted on dry and wet runway surfaces, utilized one main gear wheel, brake, and tire assembly of a DC-9 series 10 airplane. During maximum braking, the average ratio of the drag force friction coefficient developed by the antiskid system to the maximum drag force friction coefficient available was higher on the dry surface than on damp and flooded surfaces, and was reduced with lighter vertical loads, higher yaw angles, and when new tire treads were replaced by worn treads. Similarly, the average ratio of side force friction coefficient developed by the tire under antiskid control to the maximum side force friction coefficient available to a freely rolling yawed tire decreased with increasing yaw angle, generally increased with ground speed, and decreased when tires with new treads were replaced by those with worn treads.

Tanner, JA Stubbs, SM
Langley Research Center NASA-TN-D-8455, Oct. 1977, 167 pp

ACKNOWLEDGMENT: NTIS
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N77-33150/2ST

01 174579
STATE-OF-THE-ART OF TURBOFAN ENGINE NOISE CONTROL
The technology of turbofan engine noise reduction is surveyed. Specific topics discussed include: (1) new fans for low noise; (2) fan and core noise suppression; (3) turbomachinery noise sources; and (4) a new program for improving static noise testing of fans and engines.

Conf-Presented at Noise-Con 77, Hampton, VA., 17-19 Oct. 1977; Cosponsored by Inst. Of Noise Control Eng.

Jones, WL Groeneweg, JF
National Aeronautics and Space Administration NASA-TM-73734, Oct. 1977, 22 pp

ACKNOWLEDGMENT: NTIS
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N77-33166/8ST

01 174589
A RESEARCH PROGRAM TO REDUCE INTERIOR NOISE IN GENERAL AVIATION AIRPLANES. DESIGN OF AN ACOUSTIC PANEL TEST FACILITY
The design, construction, and costs of a test facility for determining the sound transmission loss characteristics of various panels and panel treatments are described. The pressurization system and electronic equipment used in experimental testing are discussed as well as the reliability of the facility and the data gathered. Tests results are compared to pertinent acoustical theories for panel behavior and minor anomalies in the data are examined. A method for predicting panel behavior in the stiffness region is also presented.

Roskam, J Muirhead, VU Smith, HW Henderson, TD
Center for Research, Incorporated Prog Rpt. NASA-CR-155152, Aug. 1977, 102 pp

Grant NSG-1301

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33957/0ST

01 174590
A RESEARCH PROGRAM TO REDUCE INTERIOR NOISE IN GENERAL AVIATION AIRPLANES. GENERAL AVIATION INTERIOR NOISE STUDY
The construction, calibration, and properties of a facility for measuring sound transmission through aircraft type panels are described along with the theoretical and empirical methods used. Topics discussed include typical noise source, sound transmission path, and acoustic cabin properties and their effect on interior noise. Experimental results show an average sound transmission loss in the mass controlled frequency region comparable to theoretical predictions. The results also verify that transmission losses in the stiffness controlled region directly depend on the fundamental frequency of the panel. Experimental and theoretical results indicate that increases in this frequency, and consequently in transmission loss, can be achieved by applying pressure differentials across the specimen.

Roskam, J Muirhead, VU Smith, HW Peschier, TD
Center for Research, Incorporated Prog Rpt. NASA-CR-155153, Aug. 1977, 159 pp

Grant NSG-1301

ACKNOWLEDGMENT: NTIS
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N77-33958/8ST

01 174591
A RESEARCH PROGRAM TO REDUCE INTERIOR NOISE IN GENERAL AVIATION AIRPLANES
Analytical and semi-empirical methods for determining the transmission of sound through isolated panels and predicting panel transmission loss are described. Test results presented include the influence of plate stiffness and mass and the effects of pressurization and vibration damping materials on sound transmission characteristics. Measured and predicted results are presented in tables and graphs.

Roskam, J Muirhead, VU Smith, HW Peschier, TD Durenberger, D
Center for Research, Incorporated Prog Rpt. NASA-CR-155154, KU-FRL-317-5, Oct. 1977, 76 pp

Grant NSG-1301

ACKNOWLEDGMENT: NTIS
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N77-33959/6ST

01 174796
SELECTED DESIGN PARAMETERS FOR RECLINING SEATS BASED ON ENGINEERING ANTHROPOMETRY
This report discusses selected engineering anthropometric design criteria for reclining cockpit seats. The reclining back-rest positions selected were 13, 27, 51 and 65 deg from the vertical line through the seat reference point (SRP). Two seat pan angles of 10 and 20 deg were utilized. Three seating components were considered in this report, these are: the head rest, arm rest, and foot rest. The specific engineering anthropometric design parameters addressed were: the head rest hinge point location, arm rest location and orientation in space as the seat reclines, location of foot rests and the synchronization of arm rest movement with back rest inclination. (Author)

Ayoub, MM Deivanayagam, S Kennedy, KW
Texas Tech University, (7184) Final Rpt. AMRL-TR-77-44, Sept. 1977, 162 pp

Contract F33615-75-C-5013

ACKNOWLEDGMENT: NTIS
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AD-A048458/4ST

01 174824
SELECTED PAPERS ON ADVANCED DESIGN OF AIR VEHICLES
This publication contains a selection of ten papers by Professor Antonio Ferri. They are published to bring together in one place examples of Professor Ferri's most important contributions to aerospace research and development. A biography of Professor Ferri is included, together with a bibliography of his works, and tributes from his friends and colleagues.

Ferri, A
Advisory Group for Aerospace Res & Dev-NATO AGARD-AG-226, Aug. 1977, 135 pp, 193 Ref.

ACKNOWLEDGMENT: NTIS
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AD-A048875/9ST

01 174969
AIRCRAFT WAKE VORTICES (A BIBLIOGRAPHY WITH ABSTRACTS)
Wake vortices and turbulent flow across aircraft lifting surfaces are investigated in the Government-sponsored research documents. Aerodynamic characteristics of vortices are reviewed with special attention made to trailing aircraft and aviation safety. (This updated bibliography contains 232 abstracts, 25 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0067, NTIS/PS-76/0072 and NTIS/PS-75/164.

Habercom, GE, Jr
National Technical Information Service Feb. 1978, 237 pp

ACKNOWLEDGMENT: NTIS
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NTIS/PS-78/0122/8ST

01 174981
EXPERIMENTAL AND ANALYTICAL DETERMINATION OF CHARACTERISTICS AFFECTING LIGHT AIRCRAFT LANDING-GEAR DYNAMICS
An experimental and analytical investigation was conducted to determine which characteristics of a light aircraft landing gear influence gear dynamic behavior significantly. The investigation focused particularly on possible modification for load control. Pseudostatic tests were conducted to determine the gear fore-and-aft spring constant, axial friction as a function of drag load, brake pressure-torque characteristics, and tire force-deflection

characteristics. To study dynamic tire response, vertical drops were conducted at impact velocities of 1.2, 1.5, and 1.8 m/s onto a level surface; to determine axial-friction effects, a second series of vertical drops were made at 1.5 m/s onto surfaces inclined 5 deg and 10 deg to the horizontal. An average dynamic axial-friction coefficient of 0.15 was obtained by comparing analytical data with inclined surface drop test data. Dynamic strut bending and associated axial friction were found to be severe for the drop tests on the 10 deg surface.

Fasanella, EL Mcgehee, JR Pappas, MS
Langley Research Center NASA-TM-X-3561, Nov. 1977, 46 pp

ACKNOWLEDGMENT: NTIS
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N78-11052/5ST

01 175031
A SURVEY OF THE STATUS OF AND PHILOSOPHIES RELATING TO COCKPIT WARNING SYSTEMS

A survey was taken to study current cockpit caution and warning (c/w) systems, and to examine industry philosophies regarding c/w system design including current efforts to improve them. Guidelines currently in use were outlined and those which appear to have general acceptance, those which are considered ineffective or erroneous, and those with which there is broad disagreement as to validity, were delineated. Major airplane manufacturerd were surveyed and a manufacturer dealing specifically with aircraft instrumentation was consulted.

Cooper, GE
Cooper (George E) NASA-CR-152071, June 1977, 47 pp

Contract NAS2-9117

ACKNOWLEDGMENT: NTIS
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N78-13746/0ST

01 175032
INVESTIGATION OF ACOUSTIC PROPERTIES OF A RIGID FOAM WITH APPLICATION TO NOISE REDUCTION IN LIGHT AIRCRAFT

A analytic model of sound transmission into an aircraft cabin was developed as well as test procedures which appropriately rank order properties which affect sound transmission. The proposed model agrees well with available data, and reveals that the pertinent properties of an aircraft cabin for sound transmission include: stiffness of cabin walls at low frequencies (as this reflects on impedance of the walls) and cabin wall transmission loss and interior absorption at mid and high frequencies. Below 315 Hz the foam contributes substantially to wall stiffness and sound transmission loss of typical light aircraft cabin construction, and could potentially reduce cabin noise levels by 3-5 db in this frequency range at a cost of about 0:2 lb/sq. ft. of treated cabin area. The foam was found not to have significant sound absorbing properties.

Holmer, CI
Bolt, Beranek and Newman, Incorporated NASA-CR-132333, 1972, 79 pp

Contract NAS1-9559

ACKNOWLEDGMENT: NTIS
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N78-13851/8ST

01 175297
WIDE RANGE OPERATION OF ADVANCED LOW NOX COMBUSTORS FOR SUPERSONIC HIGH-ALTITUDE AIRCRAFT GAS TURBINES

An initial rig program tested the Jet Induced Circulation (JIC) and Vortex Air Blast (VAB) systems in small can combustor configurations for NOx emissions at a simulated high altitude, supersonic cruise condition. The VAB combustor demonstrated the capability of meeting the NOx goal of 1.0 g NO2/kg fuel at the cruise condition. In addition, the program served to demonstrate the limited low-emissions range available from the lean, premixed combustor. A follow-on effort was concerned with the problem of operating these lean, premixed combustors with acceptable emissions at simulated engine idle conditions. Various techniques have been demonstrated that allow satisfactory operation on both the JIC and VAB combustors at idle with CO emissions below 20 g/kg fuel. The VAB combustor was limited by flashback/autoignition phenomena at the cruise conditions to a pressure of 8 atmospheres. The JIC combustor was operated up to the full design cruise pressure of 14 atmospheres without encountering an autoignition limitation although the NOx levels, in the 2-3 g NO2/kg fuel range, exceeded the program goal.

Roberts, PB Fiorito, RJ
Solar Turbines International Tech Rpt. NASA-CR-135-297, RDR-1817-22, Oct. 1977, 44 pp

Contract NAS3-19770

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-14047/2ST

01 175301
SUPPORTING INVESTIGATIONS DURING TESTING OF THE WDL-1 AIRSHIP IN GHANA AND UPPER VOLTA [Bericht ueber Begleitende Untersuchungen bei der Erprobung des Luftschiffes WDL-1 in Ghana und Obervolta]

Test flights were made in July and August 1976 in Ghana and the Upper Volta with an airship (blimp) with a view to using this means of transportation in countries not having sufficiently developed infrastructure. A day-to-day report is given of the flight, and measurements concerning hull temperature, filling gas (He) temperature, and atmospheric and biological effects on hull and control surfaces are reported. Operational problems are also dealt with. [German]

Language in German.

Lickleder, A
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-536-76/3, 1976, 45 pp

ACKNOWLEDGMENT: NTIS
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N78-14002/7ST

01 175351
COST-EFFECTIVENESS ANALYSIS OF THE PROPOSED REVISIONS IN THE EXHAUST EMISSION STANDARDS FOR NEW AND IN-USE GAS TURBINE AIRCRAFT ENGINES BASED ON INDUSTRY SUBMITTALS

This report provides analysis of several control strategies. Those studied were: the control of newly manufactured gas turbine engines in 1981 for HC and CO only; retrofit of in-use gas turbine engines in 1985 for HC and CO only; and the control of newly manufactured gas turbine engines in 1984 for HC, CO, and NOx The cost information is incomplete and poorly documented due to a lack of detailed data. Additional error was introduced by the fact that the nature of the study demanded that assumptions and predictions be made in an attempt to ascertain future facts. The above considerations aside, the cost-effectiveness figures generated by this analysis represent EPA's best estimate of the costs imposed by the control strategies under consideration, based on industry submittals. For the purposes of this study, the JT8D was assumed to be out of production by 1984. This is no longer true and the planned growth version of this engine will be examined in a later report.

Report on Technical Support for Regulatory Action.

Wilcox, RS Munt, R
Environmental Protection Agency AC-77-02, Dec. 1977, 30 pp

ACKNOWLEDGMENT: NTIS
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PB-276508/9ST

01 175962
GENERAL AVIATION (FAR 23) COCKPIT STANDARDIZATION ANALYSIS

Cockpit design features amenable to standardization in small general aviation aircraft were studied with the goal of increasing safety. A list of 101 cockpit design features was presented to 82 experienced pilots who indicated where they believed increased standardization was warranted. Features cited by half or more of the pilots were studied further and reduced to nine design areas considered to warrant near-term action. Selection of these areas was based on analysis of accident reports and practicality considerations in addition to pilot comments. Three of the design areas relate to the cockpit functions of housing and protecting the pilot (improved body restraint system, more positive action and positive latching of adjustable pilot seats,

and door latching with a visible locked state). The remaining six areas relate to the other major cockpit function of providing the man-machine interface required to operate the aircraft (fuel management system, powerplant controls, flight instruments, powerplant instruments, instrument lighting, and electrical circuit breakers). Separate sections of the report summarize the data assembled to justify the recommendation for standardization actions in each of the nine areas. (Author)

Ontiveros, RJ Spangler, RM Sulzer, RL
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77/192, FAA-NA-77-38, Mar. 1978, 113 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052803/4ST

01 176072
PROSPECTS OF AIRSHIP APPLICATIONS
No abstract available.

Hsu, TP
Air Force Foreign Technology Division FTD-ID(RS)T-2043-77, Dec. 1977, 14 pp

ACKNOWLEDGMENT: NTIS
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AD-A051948/8ST

01 176121
SUPPORTING INVESTIGATIONS DURING TESTING OF THE WDL-1 AIRSHIP IN GHANA AND UPPER VOLTA
An evaluation is presented of the hull temperature measurements and flight data recorded during the test flight of an airship (blimp) in July and August, 1976, in Ghana and Upper Volta. The hull temperature data and related environmental parameters allow analyzing the heat transfer characteristics of the hull, the emission behavior of the surface, and the heat transfer coefficients as a function of the flow velocity. The flight data provide insight into the airship's operational performance, especially maximum and minimum cargo and fuel consumption.
Language in German.

Lickleder, A
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-536-77/1, 1977, 59 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-18012/2ST

01 176213
TESTS OF CRASH-RESISTANT FUEL SYSTEM FOR GENERAL AVIATION AIRCRAFT
A significant percentage of general aviation aircraft accidents result in postcrash fires due to the ignition of fuel spillage, often contributing injury or death to the aircraft occupants. Testing was performed to demonstrate the performance of light-weight, flexible, crash-resistant fuel cells combined with the use of frangible fuel line couplings. Included in these tests were three full-scale crash tests of a typical light twin aircraft. In all of these tests, the crash-resistant fuel system performed satisfactorily. (Author)

Perrella, WMJ
National Aviation Facilities Experimental Center Intrm Rpt. FAA-RD-78-28, FAA-NA-77-48, Mar. 1978, 32 pp

ACKNOWLEDGMENT: NTIS
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AD-A054141/7ST

01 176215
FULL SCALE CRASH TEST EXPERIMENTAL VERIFICATION OF A METHOD OF ANALYSIS FOR GENERAL AVIATION STRUCTURAL CRASHWORTHINESS
The results of the Task II effort to experimentally verify a method of analysis of the structural dynamics response of general aviation airplanes subjected to a crash environment are presented. Included in this report is a description of the preparation for the performance of four instrumented full-scale crash tests involving a single-engine, high wing type airplane. All crash testing was performed at the NASA Langley Impact Dynamics Research Facility (IDRF). The crash tests involved a wide range of impact attitudes and included one impact into a soil covered terrain.

Prepared in cooperation with Cessna Aircraft Co., Wichita, KS.
Wittlin, G Gamon, MA LaBarge, WL
Lockheed-California Company Final Rpt. FAA-RD-77-188, LR-28306, Feb. 1978, 424 pp

Contract DOT-FA75WA-3707

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A054154/0ST

01 176217
GENERAL AVIATION AIRPLANE STRUCTURAL CRASHWORTHINESS USER'S MANUAL. VOLUME III. RELATED DESIGN INFORMATION
General information is presented in this report to assist the general aviation airplane industry designer in developing improved structural crashworthiness designs. This report is initiated for the purpose of providing the General Aviation Manufacturers Association (GAMA) members with the basis for understanding the types of procedures, methods and data that are available with regard to structural crashworthiness. This document contains the following sections: (1) General Aviation Airplane Operational and Structural Characteristics; (2) Crash Environment; (3) Occupant Injury Assessment; (4) Structural Data and Methods; and (5) Structural Crashworthiness Design and Compilance Methods.
See also Volume 2, AD-A054 317.

Wittlin, G
Lockheed-California Company Final Rpt. FAA-RD-77-189-3, LR-28307-3, Feb. 1978, 121 pp

Contract DOT-FA75WA-3707

ACKNOWLEDGMENT: NTIS
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AD-A054266/2ST

01 176221
GENERAL AVIATION AIRPLANE STRUCTURAL CRASHWORTHINESS USER'S MANUAL. VOLUME II. INPUT-OUTPUT TECHNIQUES AND APPLICATIONS
This document provides a comprehensive description of program KRASH as modified. Included in this Volume of the User's Manual are the following sections.--user's guide; math model development; KRASH data requirements; and Typical Model Arrangements.
See also Volume 3, AD-A054 266.

Gamon, MA Wittlin, G LaBarge, WL
Lockheed-California Company Final Rpt. FAA-RD-77-189-Vol2, LR-28307-Vol 2, Feb. 1978, 185 pp

Contract DOT-FA75WA-3707

ACKNOWLEDGMENT: NTIS
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AD-A054317/3ST

01 176272
A PRELIMINARY COMPARISON OF THERMAL DECOMPOSITION PRODUCTS OF AIRCRAFT INTERIOR MATERIALS USING THE NATIONAL BUREAU OF STANDARDS SMOKE CHAMBER AND THE COMBUSTION TUBE FURNACE
Twelve aircraft interior materials were burned under standard flaming combustion conditions in the National Bureau of Standards (NBS) smoke chamber. Each material was also exposed to 600 Celsius (C) in a combustion tube furnace under conditions of oxidative pyrolysis. The combustion products were collected in liquid-filled impingers, and the contents were analyzed for hydrogen cyanide, hydrogen sulfide, hydrogen chloride, hydrogen bromide, and formaldehyde by differential pulse polarography, nitrogen dioxide and sulfur dioxide by visible spectrophotometry, and hydrogen fluoride by ion-selective electrode. Carbon monoxide was measured directly by a nondispersive infrared analyzer. The yields of the nine gases are reported in terms of milligrams per gram of material. The toxic gas yields were obtained for each material in the NBS smoke chamber and were compared to the yields obtained in the combustion tube furnace. The yields were also compared to those obtained using colorimetric detector tubes in the NBS smoke chamber. The extent of the correlation of the various procedures is reported. The relative yields of HCl, HCN, and H2S were found to be somewhat independent of the exposure conditions. The relative

yields of the oxidized gases, CO, HCHO, NO2, and SO2, are much more dependent on the exposure conditions. (Author)

Speitel, LC Feher, RE Spurgeon, JC
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-123, FAA-NA-77-22, Mar. 1978, 34 pp

ACKNOWLEDGMENT: NTIS
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AD-A054811/5ST

01 176621
FLYING THE DC-10, AIR NEW ZEALAND'S METHODS
This article describes Air New Zealand's operational experience with the McDonnell Douglas DC-10 wide body airliner. In more then 4 1/2 years of operation or one-quarter million engine hours, ANZ has experienced only five engine failures in flight, and its engine materials cost are the lowest of any US GE CF6 operator. This paper is divided into three parts: Derated power for take-off, a simplified cruise procedure, and inflight engine and aircraft conditon check.

Dunn, WH *Aerospace* Vol. 5 No. 3, Mar. 1978, pp 21-26, 12 Fig.

ACKNOWLEDGMENT: Aerospace
ORDER FROM: Royal Aeronautical Society, 4 Hamilton Place, London W1V 0BQ, England

01 176638
AIRCRAFT FUEL PUMPS--WHERE WE'RE AT (A REVIEW OF SOME PROBLEMS AND THEIR CURRENT SOLUTIONS)
European-designed tank-mounted boost pumps, the thermal diffuser, engine driven backing pumps and gear pumps have all changed, and improved, over the last few years. This paper outlines the reasons for the changes, the problems they are designed to overcome, and the efficacy of the solutions offered.

Prepared for ASME Meeting, April 9-13, 1978.

Thompson, JS (Plessey Company, England)
American Society of Mechanical Engineers Preprint *ASME 78-GT-10*, 1978, 9 pp

ACKNOWLEDGMENT: EI
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01 176643
DURABLE AND DAMAGE-TOLERANT COMPOSITE COMMERCIAL AIRCRAFT STRUCTURE DESIGN APPROACH
The technical information needed to competently assure the safety and durability of composite commercial aircraft structure must include a broad base of disciplined test-validated analytical procedures supported by an extensive material and structural test data base. This paper briefly addresses the safety and durability goals and requirements. A plan for development of an analytical methodology and the required data base and a cursory assessment of the success potential for this plan are presented. Some test results related to the required data base are also presented.

McCarty, JE (Boeing Company) Johnson, RW *Journal of Aircraft* Vol. 15 No. 1, Jan. 1978, pp 33-39, 11 Ref.

ACKNOWLEDGMENT: EI
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01 176650
MODERN WING TECHNOLOGY FOR GENERAL AVIATION AIRCRAFT [Tragfluegel neuer Technologie fuer Flugzeuge der Allgemeinen Liftfahrt]
This report contains the results of investigations of aerodynamic and structural design and trade-off concerning the application of modern wing technology (TNT) for aircraft. The aerodynamic design of the test-wing shows the clear superiority of the TNT-wing section compared to conventional NACA-wing sections, mainly with regard to maximum lift and L/D at high lift coefficients. Wind tunnel investigations, made with the complete *experimental model aircraft, partly exceeded the theoretical expectations.* The class of general aviation aircrafts ranges from light single-engined aircrafts of less than 2000 lb gross weight to twin-engined commercial aircrafts of up to 12,500 lb gross weight. Because of this large take-off-weight range no generally applicable wing structure exists, which is cost-effective for all general aviation aircrafts. Additionally, the most effective wing structure depends on the different production know-how and the available production facilities of the component companies. [German]

Lotz, M Hoffmann, E Huinink, B Haberland, W Staeudlin, W
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft No. 77-14, Nov. 1977, 135 pp, 12 Ref.

ACKNOWLEDGMENT: EI
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01 176656
REMOTELY PILOTED AIRCRAFT IN THE CIVIL ENVIRONMENT
Remotely piloted aircraft (RPA's) are of increasing interest to the military and others. This paper describes several existing RPA programs, the technology of several important subsystems, and the potential civilian RPA uses and associated operational concepts. Regulatory constraints are discussed and study activities that may lead to demonstration and then operational programs are described.

Gregory, TJ (Ames Research Center) Nelms, WP Karmarkar, JS *Mechanisms and Machine Theory* Vol. 12 No. 5, 1977, pp 471-479, 9 Ref.

ACKNOWLEDGMENT: EI
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01 176659
SOME OPPORTUNITIES IN THE DEVELOPMENT OF LIGHT AIRCRAFT
In a brief review of the light aircraft development history, two early aircraft types, designed by the author, are shown as examples. This is followed by a presentation of several opportunities in the development of light aircraft of advanced type. They are: methods of cost and drag reduction, improvements in STOL performance by utilizing most of the available aerodynamic surfaces for the generation of lift, as well as the use of large propellers on single-engined aircraft. Finally, the integration of lift and thrust, its history, and a proposal of how to approach the problem is presented. The paper is illustrated with diagrams showing some aircraft of historic interest, as well as some proposed solutions to the presented design opportunities.

Irbitis, K *Canadian Aeronautics and Space Journal* Vol. 23 No. 6, Nov. 1977, pp 359-370, 11 Ref.

ACKNOWLEDGMENT: EI
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01 176660
STRUCTURAL ASPECTS OF ACTIVE CONTROLS
Proceedings includes 7 papers covering the following topics: A practical optimum selection procedure for a motivator in active flutter suppression system design on an aircraft with Underwing Stores; Impact of a command and stability augmentation system on gust response of a combat aircraft; Active flutter suppression on an airplane with wing mounted external stores; Airplane math modeling methods for active control design; Consistency in aircraft structural and flight control analysis; YC-14 control system redundancy; and wind tunnel study of an active flutter suppression system. *Individual papers are indexed separately.*

AGARD Paper presented at the meeting of Structures and Materials Panel, 44th, Lisbon, Portugal, April 21, 1977.

Advisory Group for Aerospace Res & Dev-NATO Conf Paper No. 228, 1977, 106 pp

ACKNOWLEDGMENT: EI
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01 176662
TEST PROCEDURES FOR ESTABLISHING THE ALTITUDE PERFORMANCE OF TURBOFAN ENGINES TO VALIDATE CONTRACTUAL GUARANTEES
The facilities at The National Gas Turbine Establishment for direct-connect tests on turbofans and turbojets at conditions simulating flight at altitude are briefly described. The measurements that have to be made to establish performance within the prescribed limits required for contractual guarantees are derived. Techniques are discussed for eliminating the effect of small, but significant, time-variant changes which occur in the quantities being measured due to unsteadiness in instrumentation, engine and test conditions. Methods evolved for ensuring continuing operation of the instrumentation and data gathering system at the required high level of accuracy are outlined. A standardized test procedure (Test Code) for establishing contract guarantee performance at NGTE is discussed with illustrative examples.

Dean, GW (National Gas Turbine Establishment, England)
American Society of Mechanical Engineers Preprint ASME 78-GT-42, 1978, 13 pp

ACKNOWLEDGMENT: EI
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01 176699
COMPARATIVE VIBRATION ENVIRONMENTS OF TRANSPORTATION VEHICLES
Measured vibration data are presented for a number of air and surface vehicles. Consideration is given to the importance of direction effects; of vehicle operating modes such as takeoff, cruise, and landing; and of measurement location on the level and frequency of the measurements. Various physical measurement units or descriptors are used to quantify and compare the data. Results suggest the range of vibration associated with a particular mode of transportation and illustrate the comparative levels in terms of each of the descriptors. Collectively, the results form a data base which may be useful in assessing the ride of existing or future systems relative to vehicles in current operation. In addition, subjective response data obtained from vibration simulator studies are presented to illustrate human response characteristics as well as to indicate a laboratory approach for the development of ride-quality criteria.

ASME AMD, Passenger Vib in Transp Veh, presented at DesEng Techn Conf, Chicago, Ill, September 26-28, 1977.

Stephens, DG
American Society of Mechanical Engineers Vol. 24 1977, pp 59-72, 17 Ref.

ACKNOWLEDGMENT: EI
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01 176747
PASSENGER-AEROPLANE DEVELOPMENTS--THE NEXT THREE DECADES
This article describes the challenges facing airlines and manufactures, the potential for new technology, factors affecting systems design, and the near and far term needs of the air transportation industry. The key issues perceived as influencing air transport growth include market growth, energy needs, environmental issues, economics, product liability, and technology. Factors affecting systems design include community noise, airport capacity, and energy availability. Potential new technology affecting the aviation industry include air-foil technology improvements, swept-wing research, luminar flow control, fuel consumption improvements, turboprop engines, variable cycle engines, digital systems, and controls technology developments. It is noted that the largest segment in the market for new airliners will be for short to medium range airplanes; the U.S. airlines represent 60 per cent of the short-to-medium range market. It is expected that an all new airplane family in the 160 to 200 passenger size will be developed in the near future. In the long run, a quiet Short-haul Research Aircraft (ASRA) Program is under way to gain further information about developing a practical, quiet, propulsive-lift, short-haul transport. Further research is being conducted in the area of fuel conservation through new aircraft design. New developments in reactor design shielding, plus successful test of reactor containment in the event of a crash, have opened the possibility of using nuclear power as an aircraft fuel.

Withington, HW (Boeing Company) *ICAO Bulletin* Vol. 33 No. 2, Feb. 1978, pp 24-29

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

01 177013
AIR TAXI AIRCRAFT WEIGHT AND BALANCE CONTROL
No Abstract.

Federal Aviation Administration Feb. 1977, 3 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.8/5:135-1C

01 177021
CORROSION CONTROL FOR AIRCRAFT
No Abstract.

Originally issued May 5, 1973.
Federal Aviation Administration Reprint Nov. 1975, 90 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.8:C81/rept 975

01 177387
HELICOPTER OPERATORS DETAIL THEIR NEEDS
This article discusses the capabilities, economy and performance requirements of commerical and public service helicopters. Public service needs especially in the area of law enforcement work are highlighted. Lower external noise, night-vision devices, and improved hovering capability on hot days are examples of areas in which helicopters could be improved. It is noted that public service is one of the fastest growing operating fields for helicopters. The need for civilian heavy-lift operations include better engine specific fuel consumption, head-up displays, improved overall helicopter reliability, improved means for static dissipation, improved quality control for spare parts, and improved flight manuals. Other suggestions include increasing the cruise efficiency of helicopters, reducing helicopter vibration, using fly-by-wire control systems to enhance safety, dynamic systems designing to fail safe, and future large civil wide-body helicopters should have three engines for safety of operations.

Wetmore, WC *Aviation Week and Space Technology* Vol. 108 No. 21, May 1978, pp 22-24

ACKNOWLEDGMENT: Aviation Week and Space Technology
ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

01 177421
APPLICATION OF COMPOSITES ON CIVIL AIRCRAFT
This paper identifies the Civil Airworthiness Standards that apply to aircraft composite structures. It also raises selected issues wherein application of these standards may need special attention. It provides examples of civil applications of composites and summarizes the overall in-service performance with these applications.

National SAMPE (Society for the Advancement of Material and Process Engineering), 9th Conference, Atlanta, Georgia, October 4-6, 1977.

Anderjaska, AE (Federal Aviation Administration) Soderquist, JR
Soc for the Advancement of Material & Process Eng Proceeding Vol. 9 No. STC, 1977, pp 297-304

ACKNOWLEDGMENT: EI
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01 177425
CLOSE LOOK AT 7475 AND 2024 ALUMINUM FOR AIRCRAFT STRUCTURES
Results of tests on aluminum alloy 7475 indicate that the sheet material combines the high strength of alloy 7075 with the good fracture toughness of 2024. Because this combination of properties is not available in current structural sheet alloys, 7475 is considered for use in pressurized fuselage skins, wing skins, and other applications requiring high strength and fracture toughness.

Van Orden, JM (Lockheed Aircraft Corporation) Pettit, DE *Metal Progress* Vol. 112 No. 8, Dec. 1977, pp 28-31, 6 Ref.

ACKNOWLEDGMENT: EI
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01 177426
COMPUTER AIDED DESIGN: POSSIBILITIES, NECESSITIES AND APPLICATIONS IN THE DESIGN PROCESS
The report includes 2 papers aimed at defining the present possibilities, needs, and applications of computer-aided design process.

AGARD Rep N662, Paper presented at the 45th Structure and Materials Panel Meeting, Voss, Norway, September 1977.

Advisory Group for Aerospace Res & Dev-NATO Proceeding 1977, 32 pp

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01 177427
COMPUTER AIDED STRUCTURAL DESIGN APPLIED TO PRODUCTION AIRCRAFT
McDonnell Aircraft Company has pioneered the development and application of computer-aided design (CAD) to the point where all present projects utilize this technology to the maximum practical extent. The computer is used to aid the engineer in designing efficient structure and in preparing final drawings and releasing them to manufacturing. Engineering activities such as design drafting, lofting, and structural analysis utilize IBM 2250 interactive graphics terminals driven by the IBM 370 computer. This system accomplishes tasks previously done by hand with batch computer procedures. Similarly, in determining internal loads and deflections, the computer graphics system relieves the structural engineer of many mundane tasks encountered in preparing computer input and reviewing computer output from analysis programs. The engineering tasks accomplished so far with CAD and the computer hardware utilized are described.

AGARD Rep N662, Computer Aided Design: Possibilities, Necessities and Application in the Design Process. Paper presented at the 45th Structures and Materials Panel Meeting, Voss, Norway, September 1977.

Norman, WA (McDonnell Douglas Corporation)
Advisory Group for Aerospace Res & Dev-NATO Proceeding 1977, pp 1-21

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01 177428
ELECTRICAL POWER--FACTORS TO BE CONSIDERED IN FUTURE CIVIL AIRCRAFT OF MODERATE COMPLEXITY
This paper deals with the electrical power generation and associated distribution system chosen for a feeder liner of moderate size and complexity designed for inservice introduction in the early 1980s as exemplified by the HS. 146 project. The HS. 146 is a four-engine high wing aircraft designed to carry approximately 70 passengers economically over stage lengths of typically 150 nautical miles, operating from airfields with runways of some 1000/1200 meters (3500/4000 feet). Factors considered include system rating, certification aspects, the design of the busbar distribution network, and the power system characteristic.

Drury, HP (Hawker Siddeley Aviation Limited) *Aeronautical Journal* Vol. 81 No. 803, Nov. 1977, pp 502-508, 1 Ref.

ACKNOWLEDGMENT: EI
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01 177435
NATIONAL SAMPE TECHNICAL CONFERENCE, 9TH, 1977
This volume contains 45 papers presented under the theme "Materials and Processes--In-Service Performance" because of the increased importance being placed on the total life cycle aspects of structures in service. The papers cover a wide range of materials but the emphasis is placed upon the composite materials applications and testing. Selected papers are indexed separately.

National SAMPE (Society for the Advancement of Material and Process Engineering), 9th Conference, Atlanta, Georgia, October 4-6, 1977.

Soc for the Advancement of Material & Process Eng Proceeding Vol. 9 No. STC, 1977, 562 pp

ACKNOWLEDGMENT: EI
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01 177436
NEED FOR IMPROVED MATERIALS IN INTEGRAL AIRCRAFT FUEL TANKS
This paper is based on an extensive Engineering Investigation of corrosion frequently found in jet aircraft integral fuel tanks. The evidence presented shows the need for development and use of improved coatings, sealants, and assembly methods in future jet aircraft fuel tanks.

National SAMPE (Society for the Advancement of Material and Process Engineering), 9th Conference, Atlanta, Georgia, October 4-6, 1977.

Trimble, MH (Delta Air Lines)
Soc for the Advancement of Material & Process Eng Proceeding Vol. 9 No. STC, 1977, pp 3-8, 5 Ref.

ACKNOWLEDGMENT: EI
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01 177437
NEW COST-EFFECTIVE TITANIUM ALLOY WITH HIGH FRACTURE TOUGHNESS
Aircraft applications requiring high fracture toughness at moderate strength levels are predicted for CORONA-5, a new titanium alloy with the composition Ti-4.5Al-5Mo-1.5Cr. As an economical alternative to conventional alloys, CORONA-5 is said to feature lower processing temperatures, reduced tool and die material costs, improved die and tool life, reduced energy consumption, and lower material control costs.

Berryman, RG (Rockwell International) Chestnutt, JC Froes, FH *Metal Progress* Vol. 112 No. 8, Dec. 1977, pp 40-45, 10 Ref.

ACKNOWLEDGMENT: EI
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01 177438
POWER PLANT RELIABILITY
Proceedings includes 18 papers which discuss aircraft engine reliability from the following four aspects: reliability of current civil and military engines as experienced by their users; civil and military authorities' plans to promote improved reliability in future engines; what manufacturers are doing to improve reliability through design and testing programs; and the role that engine monitoring and diagnostics is taking in minimizing the impact of engine unreliability for both civil and military users. The papers give insight into major causes for engine unreliability and show the need for comprehensive data feedback to manufacturers. Selected papers are indexed separately.

AGARD Conf Proceeding, Power Plant Reliability, paper presented at the Meeting of AGARD Propulsion and Engineering Panel, 49th, The Hague, Netherlands, 31 March-1 April 1977.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 215, Aug. 1977, 230 pp

ACKNOWLEDGMENT: EI
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01 177441
RETURN OF THE PROPELLER
Modern aircraft may "progress back" to the propeller. A promising new hybrid design combines features of the conventional prop and the fan section of a turbofan engine. Preliminary research indicates that the new "prop-fan" will use significantly less fuel than present turbofan engines. If problems such as excessive noise can be solved, NASA says the new prop-fan could be flying by the 1990s.

Aronson, RB *Machine Design* Vol. 50 No. 4, Feb. 1978, p 20

ACKNOWLEDGMENT: EI
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01 177444
SERVICE EXPERIENCE OF COMPOSITE PARTS ON THE L-1011 AND C-130
A set of Kevlar-49/epoxy fairings are being flight tested on three L-1011's, and have had no major service problems after 10,000 hours service. The center wing box aluminum skins and heat stiffeners were reinforced with pre-cured, bonded boron/epoxy strips on three C-130's. After almost three years and over 4000 flight hours, these components are continuing to perform satisfactorily in service. Another flight service component on the L-1011 is a graphite/epoxy floor post, which is free of service problems or defects after 10,000 flight hours.

Stone, RH (Lockheed-California Company) Harvill, WE, Jr *SAMPE Quarterly* Vol. 9 No. 2, Jan. 1978, pp 34-40, 9 Ref.

ACKNOWLEDGMENT: EI
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01 177449
THE QUEST FOR NEW TECHNOLOGIES IN THE HELICOPTER FIELD
Almost without exception, the leading helicopter manufacturers are experiencing boom times. The toy of thirty years ago has become a vital aviation tool today, although there are still areas where fixed-wing aircraft are considered better-suited; for example, there has been no significant penetration of the conventional airline market. Technically, the helicopter can be considered "mature" and much of the research now under way concentrates on fine-tuning--getting a few percentage points more efficiency here and a

few more there, increasing reliability and trimming manufacturing costs. In the marketplace, military sales growth has levelled off, but the civil sector is showing remarkable potential. These and other aspects of the helicopter today are examined.

Grangier, M *Interavia* Vol. 33 May 1978, pp 399-402

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

01 178072
STRUCTURAL DESIGN FOR AIRCRAFT IMPACT LOADING
The soft shell-hardcore approach to nuclear power plant auxiliary structure design was developed to attenuate the crash effects of impacting aircraft. In using this approach, all controls and equipment necessary for the safe shutdown of the plant as well as equipment having potential for releasing unacceptable levels of radioactivity upon destruction are arranged in the central and lower portions of the structure, immediately surrounded by strengthened wall and roof systems. This bunkered area composes the hardcore portion of the design. Above and around the exterior of the hardcore are rooms containing controls and equipment not related to the safe shutdown of the plant. These areas form the soft shell and are considered expendable for the postulated aircraft impact. This report shell-hardcore design to successfully sustain the structural features involved that would allow the soft shell-hardcore design ato successfully sustain the postulated aircraft impact. The purpose of this initial investigation is to determine the feasibility of the two 0.5 m thick walls of the soft shell with the simplest possible mathematical model.

From the Intl Conf on Struct Mech in React Technol 4th, v K(a): Seism Response Anal of Nucl Power Plant Syst, San Francisco, California, 15-19 August 1977.

Schmidt, R Heckhausen, H Chen, C Rieck, PJ Lemons, GW Commission of the European Communities Paper 8/2, 1977, 22 pp, 14 Ref.

ACKNOWLEDGMENT: EI
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01 178118
HELICOPTER, VTOL SHORTCOMINGS AIRED
Cockpit information display system deficiences are the weak points of helicopter and VTOL designs and may be the underlying cause of a significant percentage of operational accidents. There is an insufficient level of attention paid to the air data information presented to the crew and the level of human engineering that has been applied to the design of helicopters. Pilots still do not have cockpit instrument displays of basic information to enable them to have a manual backup. Existing cockpit displays in some aircraft are well behind the state-of-the-art from a human engineering standpoint. It is noted that current technology could develop a helicopter cockpit that would permit safe, single-pilot flight on instruments throughout the aircraft's flight evelope with the same confidence and precision that could be executed on a clear, calm day. Density altitude, flight path and speed through the air mass, continuous dynamic presentations of power and control margins available from instant to instant are additional parameters that should be readily available for the pilot's use.

Harlamor, SW *Aviation Week and Space Technology* Vol. 108 No. 22, May 1978, pp 56-57

ACKNOWLEDGMENT: Aviation Week and Space Technology
ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

01 178261
FEASIBILITY STUDY OF A HYBRID AIRSHIP OPERATING IN GROUND EFFECT
A hybrid airship is developed in the context of an all-cargo aircraft operating in ground effect for increased performance. The concept is proposed for the transportation of containerized freight on the transatlantic route from New York to London. A performance and economic algorithm has been developed to compare the hybrid and conventional airship designs. A parametric study has been performed that covered vehicle gross weights from 250 to 4000 tons. The metric used for comparing the two designs was the potential profit for a year's operation. Results of the study show that the hybrid has a higher annual profit up to a gross weight of about 1500 tons. A 1000-ton hybrid, offering a 43% higher annual profit over the conventional airship, is selected as a feasible design point for future development.

Calkins, DE (Federal University of Rio de Janeiro, Brazil) *Journal of Aircraft* Vol. 14 No. 8, Aug. 1977, pp 809-815, 12 Ref.

ACKNOWLEDGMENT: EI
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01 178266
PROCEEDINGS OF THE IEEE NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, (NAECON '76), 1976
The 148 papers comprising the Proceedings are concerned with navigation systems; electronics standardization; systems avionics; new signal processing concepts; measurements in missile test and evaluation; technology in medicine; maintenance of weapon system avionics; avionic support software systems; microprocessors; multisensor system integration; laser and infrared materials; applications of aerospace technology to ground transportation; controlling life cycle costs; pointing, tracking, and stabilization; strapdown vs. gimbal inertial navigation; radar technology and applications; engineering management; airborne fire control and guidance systems; electrical insulation for high voltage aircraft systems; airborne electrooptical imaging technology; life cycle cost modeling; higher order language for avionics; and air traffic control.

Institute of Electrical and Electronics Engrs Proc Proceeding 1976, 1000 pp

ACKNOWLEDGMENT: EI
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01 178457
JET NOISE SOURCE MODIFICATION DUE TO FORWARD FLIGHT
The effects of forward flight on the turbulence characteristics of a jet in a coflowing stream have been determined for a 2.22 in. circular jet in a 36 in. free jet wind tunnel. The nozzle exit velocity was 400 fps and the tunnel velocity was set at 0, 40, 120, and 200 fps. Measurements of flow properties including mean velocity, turbulence intensity and spectra, convection velocity, integral length scale, and convected frame integral time scale were carried out using two linearized hot wires. Results were used to predict changes due to flight in the jet acoustic sources. The noise reductions for a cold jet with a velocity of 1000 fps, due to the change in acoustic sources in flight, agreed well at all angles with measured noise reductions.

Larson, RS (Pratt and Whitney Aircraft) McColgan, CJ Packman, AB *AIAA Journal* Vol. 16 No. 3, Mar. 1978, pp 225-232, 14 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

01 178462
VERY LARGE AIRCRAFT--TECHNOLOGY AND OPERATIONAL IMPLICATIONS
This paper discusses future growth trends of commercial aircraft, starting with historical patterns that indicate the changes in airplane physical dimensions and weight that have occurred over the last several decades. Reasons for the observed growth are reviewed. Size of today's large aircraft is summarized for reference. Projections of commercial needs for the future are outlined. Their potential impact on future aircraft growth patterns is shown in terms of added range, payload, and change in cruise speed. The consequences and benefits of switching to alternate fuels, returning to turboprop power plants, adopting airships, or revitalizing sea planes is examined. Benefits of advanced technology considering new structural materials, laminar flow control, and advanced light control systems is discussed. Typical aircraft of the future are illustrated. From this collection, a likely list of candidates that may be operational in 1955 is offered, together with the rationale for their selection.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Foss, RL (Lockheed-California Company)
American Society of Civil Engineers Proceeding 1977, pp 172-196

ACKNOWLEDGMENT: EI
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01 178468
DIGITAL CONTROLLERS FOR VTOL AIRCRAFT
Using linear-optimal estimation and control techniques, digital-adaptive control laws have been designed for a tandem-rotor helicopter which is equipped for fully automatic flight in terminal area operations. Two distinct

discrete-time control laws are designed to interface with velocity-command and attitude-command guidance logic, and each incorporates proportional-integral compensation for nonzero-set-point regulation, as well as reduced-order Kalman filters for sensor blending and noise rejection. Adaptation to flight condition is achieved with a novel gain-scheduling method based on correlation and regression analysis. The linear-optimal design approach is found to be a valuable tool in the development of practical multivariable control laws for vehicles which evidence significant coupling and insufficient natural stability.

Stengel, RF (Princeton University) Broussard, JR Berry, PW *IEEE Transactions on Aerospace & Electronic System* Vol. AES No. 1, Jan. 1978, pp 54-62, 8 Ref.

ACKNOWLEDGMENT: EI
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01 178474
NONLINEAR APPROACH TO THE DESIGN OF JET ENGINE CONTROL SYSTEMS

This work uses a multiple time scaling analysis of jet engine dynamics to derive a nonlinear minimum time control law. The ideas are based on concepts taken from singular perturbation theory. Further reductions in model order are permitted by this approach, which results in a feedback form for the control solution. Numerical results are given which compare the accuracy of the solution with open-loop solutions obtained using conjugate gradient and dynamic programming methods.

Proc of the IEEE Conf Decis Control Inst Symp Adapt Processe, 16th and Special Symp on Fuzzy Set Theory and Appl, New Orleans, Louisiana, December 7-9, 1977.

Sridhar, B Calise, AJ
Institute of Electrical and Electronics Engineers Proceeding 77CH1269-OCS, 1977, p 1181, 5 Ref.

ACKNOWLEDGMENT: EI
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01 178475
EVALUATION OF AIRFRAME NOISE PREDICTION METHODS

Predictions by Revell's drag element model, and Hardin's total aircraft noise method where applicable, are compared with measured flyover noise spectra for different configurations of a large commercial jet transport, a business jet, a small twin-propeller aircraft, and a sailplane. These two methods had been recommended in the NASA Aircraft Noise Prediction (ANOPP) study. Predictions by a noise component method recently developed at United Technologies Research Center (UTRC) under a contract with FAA also are shown. This new method gives closest agreement with measured flyover spectra. The total aircraft noise method, which applies only for aircraft in the clean configuration, was in poor agreement with measured spectra.

Noise and Fluids, presented at the Winter Annual Meeting of ASME, Atlanta, Georgia, 27 November-2 December 1977.

Fink, MR (United Technologies Research Center)
American Society of Mechanical Engineers Proceeding 1977, p 69, 13 Ref.

ACKNOWLEDGMENT: EI
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01 178476
AIRCRAFT NOISE AND STRUCTURAL VIBRATION

Noise-induced structural vibration is one potential impact from Concorde SST operations into U. S. airports. Noise measurements made during the first 12 months of Concorde SST operations at Dulles International Airport are examined to compare the potential for such impacts by the Concorde SST and conventional subsonic long-range aircraft, for a "worst-case" location directly under the approach path.

Wesler, J *Sound and Vibration* Vol. 12 No. 2, Feb. 1978, pp 24-28, 7 Ref.

ACKNOWLEDGMENT: EI
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01 178477
SOME ASPECTS OF AIRCRAFT MANUFACTURING IN SOUTH AFRICA

In this article, a general review is given of the manufacturing process disciplines, quality control requirements and some of the manufacturing processes.

van der Westhuizen, JJ *South African Mechanical Engineer* Vol. 27 No. 12, Dec. 1977, pp 386-392

ACKNOWLEDGMENT: EI
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01 178478
COMPOSITE APPLICATIONS AND DEVELOPMENT FOR COMMERCIAL TRANSPORT

Advanced composite materials provide substantial weight savings over conventional metal structure, and for the new generation of aircraft, offer a significant improvement in range, performance, and fuel economy. Current developments in composite technology for commercial transports include fabrication and flight service evaluation of composite structures, which range from lightly loaded fairings and secondary structure such as control surfaces, to primary structural parts such as the L-1011 vertical fin, floor posts, and beams. Primary activities in materials and process development include evaluation of composite durability, development of new resin matrix systems for improved environmental and heat resistance, and development of low-cost processing techniques such as pultrusion and thermoforming.

Stone, RH (Lockheed-California Company)
American Society for Metals No. 76-57, 1976, 6 pp

ACKNOWLEDGMENT: EI
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01 178523
METHODS FOR PREDICTION OF THE INFLUENCE OF ICE ON AIRCRAFT FLYING CHARACTERISTICS

A three stage predictive method for determining the effect of ice on aircraft flight characteristics is proposed: Determination of ice deposit shapes and sizes in simulated icing environment of the icing wind tunnel; fabrication of ice imitators of these and conventional wind tunnel testing of their aerodynamic effects, especially with 2-dimensional technique; and, an application procedure of the 2-dimensional data to the 3-dimensional aircraft. The three stages are discussed and results are presented regarding tunnel force measurements and flight investigations. Conclusions are also presented regarding the methods used to predict the influence of ice and the aerodynamic effects of wing icing.

This report was prepared by the Swedish-Soviet Working Group on Scientific-Technical Cooperation in the Field of Flight Safety.

Ingelman-Sundberg, M Trunov, OK Ivaniko, A
Swed-Soviet Wrkg grp Sci-Tech Coop Fld Flight Sfty Item 2.2, 1977, 44 pp, Figs.

ACKNOWLEDGMENT: Swedish-Soviet Working Group on Flight Safety
ORDER FROM: International Civil Aviation Organization, 1080 University Street, Montreal 101, Quebec, Canada Swedish Board of Civil Aviation, 161 89 Bromma, Sweden USSR Ministry of Civil Aviation, Leningradsky Prospect 37, Moscow A-167, USSR

01 180121
AIRCRAFT NOISE

Efforts to meet FAR 36 noise emissions standards for subsonic transport aircraft and jet aircraft are discussed. Retrofitting of the existing fleet to bring it into compliance with FAR 36 was reviewed. Comparative effectiveness with time of three alternative aircraft modification programs in reducing impacted land area within VEF 30 noise exposure contours at major U.S. airports is given.

Prepared for Hearings before the Subcommittee on Aviation of the Committee on Public Works and Transportation, 94th Congress, 2nd Session, September 9, 1976.

United States House of Representatives 1976, 27 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N77-26138)
ORDER FROM: GPO
GPO 77-918

01 180176
THE CHANGING HORIZONS FOR TECHNICAL PROGRESS IN AIR TRANSPORTATION

Some of the most promising potential technological developments in the air transportation field are discussed, including improvements in airframe design, aircraft engines, and active controls hardware. Major obstacles to

these relatively short term developments are considered. Special attention is given to the problem of fuel economy. Technologies requiring a longer time-scale for reserch and development, including advanced turboprop engines, all-wing concepts, and laminar flow control, are outlined. The potential impact of hydrogen-based power plants on the development of super-and hypersonic transports is examined.

From the Place of Aviation in Society; Proceedings of the 15th Anglo-American Aeronautical Conference, London, England, 31 May-2 June 1977 9A77-41926 19-03).

Frisbee, LE Hopps, RH (Lockheed-California Company)
Royal Aeronautical Society Proceeding 1977, 23 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41946)
ORDER FROM: AIAA

A77-41946

01 180187
BETTER PERFORMANCE FOR AIRCRAFT TRACKING AND HOLDING UNDER GUST AND SHEARWIND INFLUENCE BY USE OF DIRECT DIGITAL CONTROL [Ein Beitrag zur Erhoehung der Bahnfuehrungsgenauigkeit von Flugzeugen Gegenueber Windstoerungen mit Hilfe Einer Direkten Digitalen Steuerung]

In this paper, the application of direct digital control for aircraft control is proposed. Using this control technique, no aerodynamic states are considered for the invariance conditions against wind and gust disturbances. Thus, high accuracy for path holding and tracking can be achieved. A simple iteration procedure calculates the control input necessary to compensate the influence of wind on the commanded aircraft acceleration. The inverse solutions of the nonlinear and coupled equations of forces and moments were determined on-line by use of an airborne digital computer. [German]

Schlueter, HG Bender, K
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft No. 77-48, 1977, 39 pp, 4 Ref.

ACKNOWLEDGMENT: EI
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01 180189
MODULAR ENGINE MAINTENANCE CONCEPT CONSIDERATIONS FOR AIRCRAFT TURBINE ENGINES

The modular engine maintenance concept offers great potential for cost of ownership savings in reduced overhaul costs, spare engine requirements and transportation costs. The potential savings are enhanced when the initial engine design incorporates the modular concept. The capability must exist to isolate failure modes to a particular module of the engine. This capability should exist at the base level and include analytical and inspection techniques. The failure modes can be classified as either affecting the structural integrity or performance output of the modules. The structural failure modes are usually determined through indirect means, and the failures affecting performance through direct methods such as gas path analysis.

Edmunds, DB (Wright-Patterson AFB) *Aircraft Engineering* Vol. 50 No. 1, Jan. 1978, pp 14-17, 3 Ref.

ACKNOWLEDGMENT: EI
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01 180193
THREE DIMENSIONAL AND UNSTEADY SEPARATION AT HIGH REYNOLDS NUMBERS

The lecture series includes 13 papers devoted to two major problems, namely, the physics of flow separation and reattachment, with particular reference to turbulent flows, and a consideration of some practically important types of separated flows which occur in aeronautics. Under both headings, lectures are included on the most recent experimental work, computational techniques, and prediction methods. An attempt is also made to assess progress and to identify those areas in which further work should be done. Selected papers are indexed separately.

AGARD Lecture Series presented at Von Karman Inst, Rhode-Saint Genese, Belgium, February 20-24, 1978.

Advisory Group for Aerospace Res & Dev-NATO Lecture Series N.94, 1978, v.p.

ACKNOWLEDGMENT: EI
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01 180194
WIRING HARNESS DESIGN AND FABRICATION FOR THE L-1011

Wire-harness design and fabrication were a particular problem because not only is the L-1011 a large aircraft, but it has installed in it many complex and sophisticated electronic systems that were not available for earlier aircraft projects. A computer-based system for the design and fabrication of aircraft wiring is described. The system has two engineering databases: a wire-list database of point-to-point wiring information and a computer graphics database of system intercommection schematics. The wire list and schematics are compared by computer to ensure error-free engineering data. Two additional databases, one which determines fabrication sequence and another which controls and schedules the release of fabrication documents, complete the system. The wire list and fabrication sequence databases are combined to produce all documents required to fabricate, test and install wiring harnesses.

Kronman, J (Lockheed-California Company) *Computer Aided Design* Vol. 10 No. 2, Mar. 1978, pp 141-145, 1 Ref.

ACKNOWLEDGMENT: EI
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01 180415
NEW TRENDS AND PROBLEM AREAS IN AUTOMATIC FLIGHT CONTROL

For most current high performance aircraft, automatic control is necessary for desirable performance in a majority of operational flight regimes. In many new designs it will be necessary even for marginally successful performance. To meet these challenges new flight control technology exhibits two predominant trends. The first of these discussed is "Expansion in Functions" . Most of these additional functions are the consequence of greater interdependence between airframe and controller. The second trend, "Changes in Mechanization Features" , is a veritable revolution in which digital/discrete replace analog/continuous controller elements.

Proceedings of the 19th Annual Conference on Aviation and Astronautics, Tel Aviv and Haifa Israel, May 2-3, 1977.

McRuer, D (Systems Technology, Incorporated) *Israel Journal of Technology* Proceeding Vol. 15 No. 1/2, 1977, pp 1-10, 52 Ref.

ACKNOWLEDGMENT: EI
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01 180420
NOTE ON THE MEASUREMENT OF RUNWAY TRACTION

The ability to predict the stopping performance of aircraft is closely related to the accurate measurement of peak traction at the tire-runway interface. Efforts to correlate ground vehicle measurements with automotive tires to airplace performance have not been very successful. Major differences exist between automotive tires and the Type VII aircraft tires that contribute to this lack of correlation. Additionally, the ground vehicle should also have a brake cycling device. A tire model law is being developed to achieve a better correlation.

Wahi, MK (Boeing Company) *Tire Science and Technology* Vol. 5 No. 3, Aug. 1977, pp 155-156, 16 Ref.

ACKNOWLEDGMENT: EI
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01 180421
FLAMMABILITY PROPERTIES OF SOME THERMOPLASTIC AND THERMOSET RESINS

The thermochemical and flammability properties of some polymers considered for use in aircraft interiors are described. The properties studied include: (1) thermochemical properties such as glass transition and melt temperature; (2) dynamic thermogravimetric analysis in anaerobic environment; (3) flammability properties such as oxygen index, flame spread, and smoke evolution, and (4) selected physical properties. The thermoplastic polymers evaluated included polyphenylene sulfide, polyaryl sulfone, 9, 9-bis (4-hydroxyphenyl)-fluorene polycarbonate-poly (dimethylsiloxane) and polyether sulfone. The thermoset polymers evaluated included epoxy, bismaleimide, a modified phenolic and polyaromatic melamine resin.

Kourtides, DA (Ames Research Center) Parker, JA *SAMPE Quarterly* Vol. 9 No. 3, Apr. 1978, pp 36-43, 31 Ref.

ACKNOWLEDGMENT: EI
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01 180425
SIKORSKY S-76 PROGRAM
The S-76 is a new helicopter designed for the commercial market in general, and in particular, is designed to serve the off-shore oil market and meet its requirements; that is to carry 12 passengers and a crew of two on a 400 nautical mile radius mission with flotation equipment and operate IFR Category A. A definite requirement exists for a long range, over water helicopter to transport crews to and from the oil rigs. The S-76 is designed to that mission. All this is to be achieved in a helicopter weighing less than 10,000 lbs.

AGARD Conference Proceeding No. 233: Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffet Field, California, May 16-19, 1977.

Donovan, RF (Sikorsky Aircraft Division)
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 13, 1978, 14 pp

ACKNOWLEDGMENT: EI
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01 180426
ROTOR SYSTEMS RESEARCH AIRCRAFT--A NEW STEP IN THE TECHNOLOGY AND ROTOR SYSTEM VERIFICATION CYCLE
The National Aeronautics and Space Administration and the United States Army have jointly contracted for the development of two Rotor Systems Research Aircraft (RSRA). These flight research vehicles are being developed specifically to provide a National Facility with the capabilities necessary for the effective and efficient in-flight test and verification of promising new rotor concepts and supporting technology developments. This paper addresses the capabilities of the RSRA aircraft for potential research programs. Research activities to be conducted on the RSRA are discussed with a review of technological advances anticipated from several advanced rotor concepts.

AGARD Conference Proceeding No. 233: Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffet Field, Calfironia, May 16-19, 1977.

Huston, RJ (Langley Research Center) Jenkins, JL, Jr Shipley, JL
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 18, 1978, 24 pp

ACKNOWLEDGMENT: EI
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01 180427
RESEARCH REQUIREMENTS FOR THE IMPROVEMENT OF HELICOPTER OPERATIONS
Future requirements for helicopters will place still greater emphasis on those features of the helicopter which make for simple, low cost, and effective operation. Some research necessary to meet these needs is described in the current paper. The requirements for low cost operation are reviewed. This implies a considerable improvemnnt in fatigue life, time between overhauls, and in general maintainability of the aircraft. This can be achieved by the intelligent use of new materials and a move towards on-condition maintenance of major components. Many of the operational targets for future helicopters can be set by engineering application of principles which are substantially understood at the present time. Two important exceptions to this are noise and icing. Basic features of external and internal noise are reviewed and recommendations for future work put forward. Icing research is reviewed in the light of recent British activity.

AGARD Conference Proceeding No. 233: Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffet Field, California, May 16-19, 1977.

Lowson, MV (Westland Helicopter Limited)
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 21, 1978, 13 pp, 23 Ref.

ACKNOWLEDGMENT: EI
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01 180428
EVALUATION OF THE TILT ROTOR CONCEPT: THE XV-15'S ROLE
This paper explores the need for an aircraft combining the efficient VTOL capability of a helicopter with the efficient high speed characteristics of a fixed wing turboprop. The ability of the tilt rotor concept to fill this requirement and examples as to its potential usefulness in both military and civil missions is discussed. The status of the current Army/NASA/Bell XV-15 program and its role in providing the viability of the concept is reviewed.

AGARD Conference Proceeding No. 233: Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffet Field, California, May 16-19, 1977.

Brown, JH, Jr (Ames Research Center) Edenborough, HK Wernicke, KG
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 16, 1978, 9 pp, 4 Ref.

ACKNOWLEDGMENT: EI
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01 180429
COMBINED MILITARY AND COMMERCIAL APPLICATION OF LIGHT HELICOPTERS
This discussion will present an overview of light helicopters of less than 4000 pounds gross weight used by both military and commercial aviation, Hughes Helicopters background in light helicopters, the design considerations and criteria used in the development of these helicopters, and the Army's entry into light helicopter development. It also offers some conjecture on the design considerations and criteria which might be used to develop a next generation light-weight, multi-purpose helicopter which could be used suitably by both military and commercial aviation.

AGARD Conference Proceeding No. 233; Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffet Field, California, May 16-19, 1977.

Cohen, EE (Hughes Helicopters) Amer, KB Moore, RE
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 10, 1978, 21 pp

ACKNOWLEDGMENT: EI
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01 180430
ADVANCING BLADE CONCEPT (ABC) ROTOR PROGRAM
The Advancing Blade Concept (ABC) is a relatively new type of helicopter rotor system that has been flight tested 67 hours. Flight results in a basic helicopter configuration have confirmed several important advantages of the concept and have identified some shortcomings. The background and current status of the program are presented in this paper. Rotor and test aircraft features are briefly described. Flight-test data are compared with similar data from other helicopter flight tests. A qualitative assessment based upon 2 hours of US Government flying is presented. It is noted that this concept is feasible and Army contract objectives have been satisfied. It is concluded that rotor and control system weight fractions must be reduced to achieve the full potential of this concept. This would involve design and development of a lighter weight rotor system utilizing high-modulus material and redesign of the control system.

AGARD Conference Proceeding No. 233: Rotorcraft Design; Paper presented at Flight Mech Panel Symposium, NASA Ames Research Center, Moffett Field, California, May 16-19, 1977.

Young, HR (Army Air Mobility Research & Development Lab) Simon, DR
Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD Paper 17, 1978, 23 pp, 8 Ref.

ACKNOWLEDGMENT: EI
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01 183236
THE HELICOPTER: ITS IMPORTANCE TO COMMERCE AND TO THE PUBLIC
The development of vertical flight is briefly surveyed, and comments are made on market activity in the late 1970's. The uses of rotorcraft are discussed and six major markets are reviewed: the oil industry, executive transport, agricultural application, law enforcement, emergency medical transport, and heavy lift. Secondary markets are explored, and scheduled helicopter services are considered. Military spinoff, the international scene and rotorcraft safety and maintenance are also considered. The near future of the commericial helicopter and the research and developmental needs of the commericial sector are discussed. It is noted that the rotor industry

should, in view of the abudance of mechanical innovations now available to the commercial operator and the widening spectum of helicopter usage, do more to publicize its efforts. Among the challenges of th enear future are the development of multi-engine designs, and IFR capability. Closely related is the need to develop air traffic control procedures which utilize to the maximum the helicopter's unique capabilities for precise maneuver and variable air-speed. Anti-and de-icing technology as well as the requirement of pressurization are discussed. Comments are made on the establishment of effective and profitable services, the production of rotorcraft, and other relevant considerations.

Davis, AN Richardson, RA
Helicopter Association of America Mar. 1978, 137 pp

ACKNOWLEDGMENT: Helicopter Association of America
ORDER FROM: Helicopter Association of America, 1156 15th Street, NW, Washington, D.C., 20005

01 183237
CAREERS IN ROTORCRAFT

The need for education and training to meet the present needs and future challenges in rotorcraft operation is noted. Far sighted helicopter operators, the military services and a few civilian agencies and educational institutions have recognized the need for early training and education in this area. Both the Helicopter Association of America and the American Helicopter Society are concerned with the educational aspects of the rotorcraft industry. Both maintain lines of communication for response to inquiries and the provision of technical expertise. Regular courses and graduate level fellowships are provided by these institutions. The Federal Aviation Administration offers continually updated publication on rotorcraft, as well as compenhensive listings of helicopter-related education programs. It is noted that there is a pressings need for aviation mechanics at the present time. Comments are made on the training of Airframe and Powerplant mechanics, the rating of Aircraft Inspector, and the functions of a pilot. The pilot training program is discussed. The potential of the helicopter and development of its role will necessitate the establishment of coordination channels between industry and education, and the broadening of present programs. The helicopter operator and the associations and societies formed to serve him, will assume increasing responsibilities for orientation, education and training.

Davis, AN Richardson, RA *Journal of Aerospace Education* Nov. 1976, pp 4-6

ACKNOWLEDGMENT: Journal of Aerospace Education
ORDER FROM: Society of Aerospace Engineers, 1725 DeSales Street, Washington, D.C., 20036

02 131573
AIR SERVICE TO SMALL COMMUNITIES
Changes in air service at small communities and the level of service protection provided by the current system of economic regulation is reviewed, and the development of unsubsidized commuter air service and the stability of that service is examined. The study estimates what service losses might be expected at small communities if the existing system of economic regulation and the present subsidy system were eliminated, and provides estimates of the costs of providing continued air service to small communities through a more efficient subsidy system. The study showed that as a result of natural market forces, commuters provided a far greater continuity and reliability of service than had previously been thought. Communities which receive service from commuter airlines are far less likely to lose it than those receiving regulated service. Conclusions are also drawn concerning the fast growing commuter segment of the air transport industry, the viability of commuter service at low passenger levels, subsidies to regulated carriers, route restrictions to regulated carriers, and an alternative to the subsidy program.

Department of Transportation Mar. 1976, 72 pp, 3 App.

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PB-251498

02 152913
MINIMUM FLEET SIZE MODELS FOR TRANSPORTATION SYSTEMS
There is an increasing interest in using computers for scheduling both fleet and crews of transportation systems. Programs that accomplish this have to be for a large part heuristic, however for some aspects an optimization approach is feasible and may improve the results. Moreover, the heuristic programs may benefit from theoretical studies that increase our knowledge of the processes involved. The purpose of this paper is to present a general fleet scheduling model together with a survey of applications to various modes of transportation. It will be shown that a general fleetsize formula for transportation systems, that expresses the transportation capacity needed in terms of vehicle departure and arrival patterns, can be applied to various situations: suburban railways, buses and airlines. In each of these models the passenger origin-destination statistics are assumed to be given, the vehicle arrivals and departures during the scheduling period (normally a day) constitute the variables. Basically these are dispatching models. Generally, there is room for another objective, apart from the fleetsize, as the number of schedules with minimum fleetsize is normally large. This approach leads to mathematical programming models for suburban railway and airline systems, which are applicable to practical situations, as is illustrated by computational results. The bus dispatching model leads to a theoretical model for optimal bus departure rates, as a function of the time of day; the model provides some clues concerning the construction of bus timetables. /TRRL/

Transportation and Traffic Theory. Proceedings of the Sixth International Symposium on Transportation and Traffic Theory. University of New South Wales, Sydney, Australia, August 26-28, 1974.

Salzborn, FJM (Adelaide University, Australia) Buckley, DJ
Elsevier Scientific Publishing Company, (444195327) Proceeding 1974, pp 607-623, 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 224480)

02 157779
LOCAL AND COMMUTER AIRLINES IN THE UNITED STATES
The theoretical background of central-place theory and the concept of similar hierarchy of transportation systems is briefly described, and comments are made on the history of local airlines and the development of commuter airlines. Trends indicate that local service airlines will increasingly resemble the major trunk airlines in terms of volume of business, routing, and operating complexity. They will move away from the marginal lines that can provide the necessary service at a much lower cost and with greater convenience than the large airlines can. These smaller airlines will, however, face increasing competition from ground transportation. Commuter airlines will need to experiment (with new technologies and innovative ideas) to maintain any advantage over their competitor. It is noted that low-order communities should be left to low-order transportation services, and that the Civil Aeronautics Board should be more liberal in allowing flow-through subsidies and elimination-substitution services.

Mayer, JD *Traffic Quarterly* Vol. 31 No. 2, Apr. 1977, pp 333-349

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02 166668
A STUDY OF COMMUTER AIR SERVICE
A regionally oriented overview of the commuter air service industry is provided. A framework for an eventual assessment of potential technology directions that may be of benefit to the industry is presented. Data are provided on the industry's market characteristics, service patterns, patronage characteristics, aircraft and airport needs, economic characteristics and institutional issues. Using personal interview and literature survey methods, investigation of a considerable cross-section of the industry was made.

Belina, FW Bush, LR
Aerospace Corporation NASA-CR-152005, June 1977, 100 pp

Contract NAS2-9380

ACKNOWLEDGMENT: NTIS
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N77-26108/9ST

02 166681
ANALYSIS OF FLIGHT EQUIPMENT PURCHASING PRACTICES OF REPRESENTATIVE AIR CARRIERS
The process through which representative air carriers decide whether or not to purchase flight equipment was investigated as well as their practices and policies in retiring surplus aircraft. An analysis of the flight equipment investment decision process in ten airlines shows that for the airline industry as a whole, the flight equipment investment decision is in a state of transition from a wholly informal process in earliest years to a much more organized and structured process in the future. Individual air carriers are in different stages with respect to the formality and sophistication associated with the flight equipment investment decision.

Gellman Research Associates, Incorporated Final Rpt. NASA-CR-154619, Jan. 1977, 81 pp

Contract NASW-2969

ACKNOWLEDGMENT: NTIS
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N77-27021/3ST

02 167490
THE AIRLINE INDUSTRY
This discussion of the management problems faced by the airline industry is presented in a series of case studies. Of interest to the airline industry, air freight shippers, government and students of transportation the dimensions of the airline industry is included in a discussion. The following topics include: Airlines in Domestic Transportation; Structure of the Airline Industry; Regulatory Environment; Airline Operations; Cost Structure; Capital Structure and Finances, and Financial Environment.

Wyckoff, DD (Harvard University) Maister, DH (British Columbia University, Canada)
Heath Lexington Books 1977, n.p.

ORDER FROM: Heath Lexington Books, Heath (DC) and Company, Lexington, Massachusetts, 02173

02 167491
THE COMMERCIAL AIRLINE INDUSTRY. MANAGERIAL PRACTICES AND POLICIES
The following topics are included in this report: A Review of the Historical Developments; Current Industry Structure; The Development of Airline Routes: Domestic and International; Domestic Passenger Fare and Freight Rate Policy Decisions; Airline Subsidy; Airline Mergers; International Aviation; Financial Practices; Airline Economics; Marketing Air Transportation Service; Techniques for Forecasting Air Passenger and Cargo Traffic. Air Carrier Industry Data; Aircraft Selection and Fleet Planning; Problems in Airline Scheduling; Airline Labor Relations, and Contemporary Issues in the Industry.

Taneja, NK (Massachusetts Institute of Technology)
Heath Lexington Books 1976, 368 pp

ORDER FROM: Heath Lexington Books, Heath (DC) and Company, Lexington, Massachusetts, 02173

02 167492
THE AIRLINE INDUSTRY. INSTRUCTOR'S MANUAL
Available to qualified instructors for use with The Airline Industry. This manual suggests how the material in The Airline Industry can be used for

classroom instruction in teaching transportation management, industry analysis, or corporate strategy. Teaching notes for all of the cases in The Airline Industry are included. Each case teaching note contains the following sections: Synopsis; purpose; suggested assignment questions; analysis; teaching strategy; what actually happened, and suggested additional readings for instructors. These notes are written to aid an instructor in providing a stimulating classroom learning experience for students.

Wyckoff, DD (Harvard University) Maister, DH (British Columbia University, Canada)
Heath Lexington Books No Date, n.p.

ORDER FROM: Heath Lexington Books, Heath (DC) and Company, Lexington, Massachusetts, 02173

02 168051
REGIONAL AIR CARRIER STUDY
The purpose of this report is to review and document the changes that have occurred since 1966 in the operations of the Regional Air Carriers. The intent is not only to provide a description of the developments over the first decade, but also to identify the underlying problems encountered under the Regional Air Carrier Policy. The report deals with almost every aspect of the Regional Air Carrier Industry: its regulations; its competitive relationship with National and Third-Level Carriers; the extent of subsidies; trends in revenue, costs, traffic and productivity; the kind of products offered and markets served. The report furthermore attempts to identify the important problems the carriers were faced with in the 1960's and those that they might be facing in the 1970's. /Author/

Greig, JA
Canadian Transport Commission Report No. 40-77-2, July 1977, 142 pp, 20 Fig., 51 Tab., 2 App.

ACKNOWLEDGMENT: Canadian Transport Commission
ORDER FROM: Canadian Transport Commission, Systems Analysis Branch, 275 Slater Street, Ottawa, Ontario K1A 0N9, Canada

02 170198
NON-STOP VS ONE STOP FLIGHTS
A case study involving a small airline serving three cities was made to determine an optimal scheduling policy. It was necessary to evaluate the profitability of alternate routings involving nonstop and one stop flights by determining the net contribution to profit of each alternative. In all cases a previously developed optimal booking procedure for allocation of available seats on the various legs of a flight was applied. The booking procedure utilizes a dynamic programming model applied to schedule dependent demand distributions for the flights and legs. The technique used is described in detail and sample numerical calculations are presented.

Ladany, SP (Ben Gurion University of Negev, Israel) Hersh, M *Transportation Research* Vol. 11 No. 3, June 1977, pp 155-159, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 170837
AIRLINE EFFICIENCY
The concept of airline efficiency is discussed from first principles, and the author concludes that there is no one valid method of arriving at a single quantitative measure having regard to all operating conditions. It is argued that profitability is not a true measure of efficiency as it does not take account of different operating environments and other objectives. A table of efficiency is presented which compares a number of airlines on the basis of nine different efficiency related parameters, covering aircraft and labor, productivity, cost and marketing efficiency and profitability.

Hofton, A *Flight International* Vol. 108 No. 3444, Mar. 1975, pp 407-408, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: IPC Transport Press

02 170838
BREAKING WITH TRADITION
Difficulties encountered in trying to compare the efficiency of airlines are pointed out, and an attempt is made to measure the comparative efficiency of several western European airlines using unweighted combinations of five different efficiency parameters. The airlines are then ranked in order of efficiency in terms of output per employee, and output per dollar of labor costs. Further statistics and tables affecting airline efficiency are also presented which tend to account for some of the anomalies observed. Finally suggestions are put forward for new methods of improving the assessment of airline efficiency.

Pearson, R *Flight International* Vol. 108 No. 3444, Mar. 1975, pp 409-412, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: IPC Transport Press

02 170842
LOCATION OF THE MEDIAN LINE FOR WEIGHTED POINTS
A mathematical model is presented for calculating a median line or lines for a set of weighted points on a plane. The model has applications in the design of transportation corridors, and is illustrated by an example. The line or corridor derived using the model is defined as the one that minimises the sum of weighted perpendiculars from the points to the line.

Wesolowksy, G (McMaster University, Canada) *Environment and Planning* Vol. 7 No. 2, Mar. 1975, pp 163-170, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Pion Limited, 207 Brondesbury Park, London NW2 5JN, England

02 170855
AN INTEGRATED SYSTEM FOR AIRLINE PLANNING AND MANAGEMENT INFORMATION
Outlines the perspective that Eastern Airlines have utilized in developing management information systems that guide the decisions in planning the path the airline will travel. Describes some of these systems that perform an integral function in the planning process, which are among the more comprehensive and useful systems in operation in any transportation network. Reviews some of the current research and systems development projects now being persued at Eastern Airlines.
Direct requests to C. Berkowitz.

Ehrlich, M (Eastern Airlines, Incorporated)
World Conference on Transport Research Apr. 1977, 26 pp

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: MAUDEP, P.O. Box 722, Church Street Station, New York, New York, 10008

02 170867
WORLD AIR TRANSPORT STATISTICS
Presents the 1975 traffic, operating and financial results of the world's scheduled airlines. Analyses of the operation of IAIA member airlines are given in detail.

International Air Transport Association 1975, 75 pp

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: International Air Transport Association, P.O. Box 160, 26 chemin de Joinville, 1216 Cointrin-Geneva, Switzerland

02 172455
REPOSITIONING FOR THE FUTURE. SUPPLEMENTS
The author presents a historical overview of the supplemental airline industry. The U.S. supplements are credited with popularizing low-cost air trips to Hawaii and across the Atlantic, and having made the concept of charters a permanent part of the U.S. air transportation system. However, proposed low fares for scheduled international airlines, promotional fares on domestic flights, the declining number of supplemental carriers, and their present financial condition seem to indicate potential problems for the future of supplemental airlines. The author traces the growth of these airlines from their statutory legitimacy in 1962 to present day efforts by scheduled airlines to curtail these activities. The author concludes that although scheduled airlines are aggressively competing supplementals are here to stay. It is important for the Civil Aeronautics Board to encourage competition whether through innovative fare schemes, new entrants, or other devices. Possible future solutions include major supplementals in each of the major market areas, increased usage of supplementals in domestic and international cargo and in long-haul domestic routes.

Feldman, J *Air Line Pilot* Vol. 47 No. 1, Jan. 1978, pp 14-17

ACKNOWLEDGMENT: Air Line Pilot
ORDER FROM: Air Line Pilots Association, 1625 Massachusetts Avenue, NW, Washington, D.C., 20036

02 172706
RE-STRUCTURING A SHORT HAUL AIRLINE SYSTEM
The route and traffic structure of a short-haul domestic carrier, where sound scheduling is particularly essential, must be seen as one among several objects of rationalisation rather than as a given framework within which to decide on aircraft equipment. To arrive in the end at an efficient transport system characterised by non-stop services of high frequency and short turnaround and transfer times, ground handling of aircraft and passengers must be a swift process and, above all, a simple one. This calls for careful thinking in the planning of terminals geared to the requirements of this special kind of traffic. Another important area of study is the rapid enplaning/deplaning of passengers and the whole turnaround process as such, as well as rapid methods of transferring connecting passengers and their baggage from one flight to another.

Jonsson, J (Linjeflyg Aktiebolag) *Shell Aviation News* No. 440, 1977, pp 2-9

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 172708
PARTNERSHIP FOR A FUTURE-AIRLINE VIEW
This paper discusses the rising costs confronting the airline industry and how they can be controlled through conservation of labor, materials, and capital. Ways in which lawyers, financiers, and regulators can cooperate to improve the airlines in the future are explored. Current research is evaluated in terms of its necessity and terms of whether the problems being investigated have been sufficiently well defined to make it productive.
Prepared for SAE Meeting, 28 February-4 March 1977.

Johnstone, PM (Eastern Airlines)
Society of Automotive Engineers Preprint SAE 770577, 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 173477
RATIONALIZATION OF THE EUROPEAN AIR NET
This paper investigates the question of whether it might be possible to rationalize, that is to increase the quality of service for a given cost, the airline network within Europe. The authors propose the approaches for analyzing transport nets and a measure of network connectivity which takes into account the intensity of connections between the nodes. This measure is reported to permit more precise discussion of the nature of any transportation network.

Gordon, S (Simat, Helliesen and Eichner) *Transportation Research* Vol. 11 No. 4, Aug. 1977, pp 235-244, 30 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 173499
SERVICES AND TECHNIQUES AT THE DISPOSAL OF DEVELOPING COUNTRIES. THEME 3: TRANSPORT [Services et techniques au service des pays en developpement. Theme III: transports]
This international congress was held in Paris in May 1976. Five main themes were considered: (1) agriculture, agricultural industries and food; (2) energy; (3) transport; (4) industrial development; (5) professional training Volume (3) contains the reports dealing with existing transport modes: New pavement construction methods, Sauterey, R; railways. Electrification of railways, Boissonnade, P; railways. Heavy Trains used for the transport of coal, Broca, B; navigation. New transport modes by sea and their influence on harbour design in manufacturing countries, Sireyjol, P; aviation. Adaptation of infrastructure aeronautical techniques to developing countries, Faunieres, M; urban transport. The development of urban transport in large cities in developing countries. Derou, G; Urban transport for the better mobility of the inhabitants of the third world, de Gouville, A. [French]

Societe des Ingenieurs Civils de France Monograph May 1976, 96 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 104728), Central Laboratory of Bridges & Highways, France

02 173560
MODELING INTERCITY MODAL SPLIT: RAIL VERSUS AIR
A comparative assessment of various mathematical models used to describe the choice process between the two modes on domestic intercity routes in Great Britain.

Leake, GR (Leeds University, England) Underwood, JR *Transportation Engineering* Vol. 47 No. 8, Aug. 1977, pp 35-39, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 173704
IATA AND WHAT IT DOES
The history, organization, and activities of the International Air Transport Association, the organization of airlines supplying international commercial air services, is described, with emphasis on the activities of subdivision such as the Technical Committee (which concerns itself with establishing international standards for such matters as airport facilities, aircraft noise and emissions, communications and avionics, maintenance flight crew training, and safety) the Traffic Committee (which is concerned with such matters as scheduling, fare structures, and establishing standards and regulations regarding such procedures as passenger reservations and cargo and baggage handling), and the Legal Committee (which is concerned with such matters as liability, conditions of carriage, and security). The book also contains several appendices, including the Association's bylaws, a list of member airlines, and some safety figures.

Brancker, JWS
Sijthoff (AW) International Publishing Company, BV 1977, 257 pp

ORDER FROM: Sijthoff (AW) International Publishing Company, BV, Schuttersveld 9, Postbus 26, Leyden, Netherlands

02 173817
PROSPECTS BRIGHTEN FOR FINANCING NEW EQUIPMENT PURCHASES
This special report highlights the current and future financial status of the airline industry. The first article notes that prospects seem brighter for financing new equipment purchases. The investment tax credit, the aircraft noise financing bill and the CAB pass through fare are all factors that appear to be working in the U.S. airlines' favor. Individual opinions on this subject are given by financial analysts, the banks, the insurance industry, the Export-Import Bank, the consultants, the lessors, and the airlines. The second article discusses the possibility of the European airlines being the big spenders in the near future. It is expected that the airlines will have no great difficulty in raising the necessary funds. The third article discusses the question of airline diversification and it is noted that it has helped some carriers and nearly sunk others. The two strongest, Delta and Northwest haven't branched out at all. The fourth article examines the consequences of the increased airline competition. The CAB feels that inefficient carriers have for too long been operating in a regime of protectionism and cost-plus pricing. The final article discusses whether the thrust fund will vary for new airline fleets. It is noted that noise legislation could play a key role in upcoming carrier decisions on purchases of new transports.

Baumgarner, JD *Air Transport World* Vol. 15 No. 3, Mar. 1978, pp 21-36

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

02 173837
UK CHARTER CARRIERS: A VITAL FORCE IN A SPREADING MARKET
This article describes the UK charter carrier market and focuses on the activities of five major airlines-Britannia Airways, British Airtours, Dan-Air, Laker Airways, and Monarch Airlines. The UK non-scheduled carriers have apparently not been affected by inflation, the devaluation of the Pound sterling or the leap in fuel prices. They have demonstrated their flexibility and entrepreneurial skill by finding alternative solutions and remaining financially sound. The UK Civil Aviation Authority has not hampered independant carriers by giving preferential treatment to the national carrier. The Authority's policy is to impose the least restraint on the industry and encourage the provision of profitable services by British airlines in both public and private sectors. It is noted that the independant carriers have the distinct advantage of having two London airports at their disposal-Gatwick and Lutton. Both have rail and road links and have excellent passenger facilities.

Tallon, P *Interavia* Vol. 33 Feb. 1978, pp 131-135, Phots.
ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

02 173851
COMPARATIVE STATIC PROPERTIES OF REGULATED AIRLINE OLIGOPOLIES
Airline regulation is assumed to fix fares and the number of competitors. Noncooperative schedule determination in a single regulated market served by a small number of carriers is analyzed. Comparative static effects of changes in cost and demand conditions, regulated fares, and numbers of carriers on rates of return, load factors, flight frequency, and excess profits are considered. The signs of important effects are either definite or depend simply on one or two observable magnitudes. Interpretations of the results are presented, and some implications for regulatory policy and future research are discussed. /Author/

Schmalensee, R (Massachusetts Institute of Technology) *Bell Journal of Economics* Vol. 8 No. 2, 1977, pp 565-576, 1 Tab., Refs.

ACKNOWLEDGMENT: Bell Journal of Economics
ORDER FROM: American Telephone and Telegraph Company, 195 Broadway, Room 01-1940, New York, New York, 10007

02 173857
THE AIRLINE INDUSTRY--AN ANALYSIS OF ASSET AND INVESTMENT MANAGEMENT 1959 TO 1990
Four basic steps are in this study. First, the historical record from 1959 to 1975 is examined then the return on assets, using pretax internal funds and the rate of investment, is examined. Second, the years 1967 to 1975 are simulated to determine how much investment the particular company should have made, when it should have occurred and the effect such a different level might have on earnings and return on assets. Third, using information from the historical and simulated history, the years 1976 to 1990 are projected to determine the investment capacity of the company. Fourth, each company's investment capacity is related to its needs. Three basic conditions underlie the tables prepared for this report. First, what actually happened, what might have happened had asset management been conducted differently in the past and, based on these results, what might reasonably be expected to happen in the future. Second, the capacity to invest is being measured not the actual level of investment any particular company will make. Third, the forecast model is a series of average years-no attempt has been made to factor in cyclical peaks and valleys.

Prepared for the FAA Annual Forecast Conference, Washington, D.C., 8 December 1977.

Bache Halsey Stuart Shields Incorporated 1977, 6 pp, 3 Tab.

ORDER FROM: Bache Halsey Stuart Shields Incorporated, Bache Plaza, 100 Gold Street, New York, New York, 10038

02 173860
AIRLINES AND DISABLED TRAVELLERS
This publication deals with most of the air travel problems encountered by disabled people. The objective of the report is to inform and promote useful discussions between airlines, airport authorities, associations representing handicapped people, and aircraft designers. This report discusses the design and content of terminal buildings, aircraft design and interior fitting, safety regulations and, a list of proposals for suitable measures to be taken at airports and terminals and on board aircrafts.

ICTA (International Commission on Technical Aids, Housing and Transportation) is a Division of the International Society for the Rehabilitation of the Disabled (Rehabilitation International), 122 East 23rd Street, New York, New York 10010.

Muller, H Rolen, G
Intl Comm on Tech Aids, Housing & Transp (ICTA) Apr. 1977, 54 pp, Figs., Refs.

ACKNOWLEDGMENT: Intl Comm on Tech Aids, Housing & Transp (ICTA)
ORDER FROM: Intl Comm on Tech Aids, Housing & Transp (ICTA), Fack, Information Center, S-16125 Bromma, Sweden

02 173862
WHAT CAN THE AIRLINES LEARN FROM RAILROAD HISTORY ABOUT SURVIVAL
A short history of the decline of the rail industry is highlighted in order to help form policy objectives for the airline industry. The first lesson that the airlines can learn is to realize that bad public policy can be just as harmful to the development of the airline industry as it has been to the rail industry. Airlines, it is noted, must be more active and effective in the political arena than they are now or have been. The second lesson is that economic regulation for rail industry did not lead to the financial security of that industry. Regulations by the CAB has not provided an economic climate which will permit the airlines to develop sufficient earnings to be financially secure. The third lesson is that airline management must recognize that it is in the business of managing and marketing a mature business. The fourth lesson is that diversification can be very dangerous. Any diversification which reduces the financial strength of the airline itself, or which results in diverting management attention from the airline is dangerous. The fifth lesson is that it is just as important to have a fine balance sheet as it is to have a good market share. The sixth lesson is that the airline must come to grips with their runaway labor costs. The seventh lesson is that the airlines should not permit themselves to be compartmentalized into the various segments of the business either voluntarily by management action or by law. Lastly, mergers often look more promising then they will turn out in fact.

A speech presented by Mr. Lewis, Chairman of the United States Railway Association, at the Society of Automotive Engineers Air Transportation Meeting, Washington, D.C., 1977.

Lewis, AD
United States Railway Association Chairman 1977, 19 pp

ORDER FROM: United States Railways Association Chairman, 2100 2nd Street, SW, Washington, D.C., 20595

02 175042
HANDBOOK OF AIRLINE STATISTICS, SUPPLEMENT
This updated reference volume of 198 pages includes a wide variety of annual traffic, profit and loss, and balance sheet data for each United States Certificated Air Carrier for 1975 and 1976. Other sections include chronologies of significant events effecting aviation, growth of the airline industry, miscellaneous air transport data, comparisons of air with other modes of transportation as well as carrier group data. It also contains information involving classes of air carriers other than the Certificated Air Carriers.

See also report dated Nov 75, PB-250 519.

Gavel, P
Civil Aeronautics Board Final Rpt. CAB-BAS-77-01, Dec. 1977, 202p

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-275156/8ST

02 176626
THE COMMUTER AIRLINES, THE GROWTH POTENTIAL, REGULATORY OUTLOOK AND EQUIPMENT NEEDS
Commuter airlines comprise the fastest growing segment of the aviation industry. That fact is expected to have a significant impact on other facets of aviation because it will bring new attitudes related to the manufacture and use of aircraft and ground support facilites. This article presents an indepth look at a rapidly expanding air transportation element. The following topics are included in the discussion: Growth and outlook for the industry; the regulations; financing, promoting and ticketing; the commuter/executive combination aircraft; the in house commuter airline; the equipment; airframes; new/used commuter aircraft; high-capacity commuter aircraft, avionics, ground support equipment; batteries, tires, paints and lighting.

Business and Commercial Aviation Magazine Vol. 42 No. 2, Feb. 1978, pp 73-96

ACKNOWLEDGMENT: Business and Commercial Aviation Magazine
ORDER FROM: Ziff-Davis Publishing Company, 1 Park Avenue, New York, New York, 10016

02 176641
DECOMPOSITION AND SENSITIVITY ANALYSIS IN AN AIRCRAFT TASKING PROBLEM
This paper discusses some of the computational aspects of linking tasks on aircraft via a two-phase algorithm. The first phase may combine tasks into single flights to reduce total flying time, and the second phase attempts to schedule these flights on available aircraft. An efficient blending of the two phases which provides for possible sensitivity analysis is presented. Also, computational results with several rules for scheduling the flights on available aircraft are given, along with a proof of convergence for certain of these rules.

Armstrong, RD (Texas University, Austin) Cook, WD Martin, G *INFOR Journal/CORS* Vol. 15 No. 3, Oct. 1977, pp 332-343, 9 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 176648
FLIGHT ITINERARIES GENERATOR FOR AN AIRLINE WITH A LINEAR NETWORK
An algorithm is described which determines all flight itineraries satisfying a set of criteria between specific pairs of nodes in a linear network. This technique has been successfully applied to Air Canada's North American network in order to generate its itineraries from west to east.

Bourque, M (Montreal University, Canada) Ferland, JA Rousseau, JM *INFOR Journal/Cors* Vol. 15 No. 3, Oct. 1977, pp 393-398, 10 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 176658
SOME ELEMENTS OF THE AIRLINE FLEET PLANNING PROBLEM
Although many optimizing models have been presented for fleet planning, little success at implementation has been achieved. Examined in detail are some important problem elements that have either been assumed away, or modeled too simply, or not considered at all. Included are: year-to-year continuity conditions, integer variables, isolation of aircraft, non-linear cost and revenue functions, passenger flows, minimum service levels, multiple criteria and problem size. Some suggestions are outlined for future model development.

Pollack, M (Lockheed-California Company) *Transportation Research* Vol. 11 No. 5, Oct. 1977, pp 301-310, 15 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 176719
ADVANCED AIRLINE PLANNING MODELS--A TOOL FOR DEVELOPING REGULATORY POLICY (STUDIES IN THE ECONOMICS OF FEDERAL TRANSPORTATION POLICIES, NUMBER 6)
This paper introduces a much more detailed economic theory of the firm for carriers who supply transportation services over a network of markets. Three levels of analysis are defined for transportation economics--a system level, a market level, and a network level. One particular airline model for analysis at the network level is introduced, and then applied to a study of a potential liberalization of route authority for Continental Airlines--a medium-sized U.S. airline presently restricted to routes generally in the south-western portions of the U.S.A. /Author/

Simpson, R
Massachusetts Institute of Technology CTS 77-8, Apr. 1977, 69 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

02 176737
AIRLINES AND THE COMPUTER SPECIAL REPORT
The growing importance of computerized systems for the major airlines is discussed. Hardware, memories, software programs, terminals and communication links are continually improved on almost a daily basis. There is also a growing demand for small, relatively inexpensive mini computers and microprocessors that can do as much today as the older systems could yesterday. Based on a survey of airline computer users, the airline industry plans to double its investment in both hardware and software over the next five years. Although most airlines anticipate further speeds when buying expensive computers, the survey showed that nearly half of the airlines who have passenger reservation systems leased the service from other carriers. In reservations, there has been a steady progression from the early systems to today's fleetwide systems which give agents and travel agencies all over the world instant access to a central computer for schedule and rate information, flight reservations and interline connections, and which also print tickets automatically. It is noted that there also has been rapid progress in cargo systems, flight operations, maintenance, inventory, personnel management, and payroll. Looking to the future, a number of trends emerge that include the further growth of integrated data banks; broader use of data; travel without tickets; real-time checking; real-time air-to-ground data link; distributed processing; and growth of networks.

Lefer, H *Air Transport World* Vol. 15 No. 4, Apr. 1978, pp 20-39

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

02 176745
AIR TRANSPORT IN SUB-SAHARAN AFRICA: PART 1
This review concentrates on the air transport situation in Sub-Saharan Africa and includes a discussion on its historical background, the level of cooperation and existance, and the status of airports and facilities. It is noted that the region which includes 45 countries with a total population of over 3200 million people, accounts for only 2.4 per cent of the world traffic. The basic ingredients for growth in air transportation demand--the development of major businesses and trade centers and the growth of tourism and its related infrastructure--are just not present on a sufficiently large scale. The historical background for this area was heavily influenced by the European colonial powers (particularly, France, England, Belgium and Portugal). Many of the international and domestic routes established at that time are still in existance today. Practically all of the carriers of Sub-Saharan Africa rely today on assistance from outside to conduct their business and benefit as well from the international expertise. At an airline level, the most influential body is the IATA (International Air Transport Association), and 17 carriers of Sub-Saharan Africa are either full or associate members and benefit from the services that it offers. Airports and en-route facilities in the region leave a good deal to be desired, with the exception of South Africa. However, the influx of international technical aid has resulted in considerable improvement. Approximately 40 airports in the region can be classified as fully international and capable of handling wide-bodied jets. For the majority of the governments in the area, the lack of finance and expertise hampers growth and, despite good work by various international agencies, little change can be expected in the future.

Cockerell, N *Interavia* Vol. 33 Apr. 1978, pp 338-340

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

02 176895
REVIEW OF THE AIR TRANSPORT SITUATION--PAST, PRESENT AND FUTURE. PART 1: SCHEDULED AND NON-SCHEDULED AIRLINE DEVELOPMENT, 1966-1976. PART 2: AIR TRANSPORT TRENDS AND PROSPECTS 1976-1986
This review notes that the air transport industry performance compared well against the general economy, and that the growth over the next 10 years should average about 9 percent annually. This article reviews the scheduled and non-scheduled airline development in 1966-1976, and the air transport trends and prospects for 1976-1986. The comparatively favorable position of air transport in terms of production and revenue is due in part to the fact the price of air transport to the user did not increase as rapidly as the per capita income and price index. Various aspects of the development of air transport are compared with related indicators of general economic development and the data are tabulated. The regional variation of traffic growth rates, financial trends, fleet operation and personnel expansion are also discussed. The global assumptions regarding the future development of economic factors (which influence air transport development) made for the purpose of the trends forecast are listed. The ICAO regional passenger traffic forecasts for 1986-scheduled and non scheduled are tabulated.

ICAO Bulletin Vol. 32 No. 10, Oct. 1977, pp 18-25

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

02 177005
AIR CARRIER OPERATIONS INSPECTOR'S HANDBOOK
No Abstract.

Federal Aviation Administration Oct. 1977, 550 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

FAA 8430.6B

02 177388
AIRLINES OF THE WORLD
This book is an attempt to compile a thorough listing of scheduled commercial airlines for passenger travel. General information, statistical facts, histories and route maps are given for the major air lines. An additional listing of U.S. intrastate, commuter, mail and taxi services, as well as foreign air carriers with offices in the United States is included.

Phillips, LK
Gordon Press Aviation Series, 1977, 133 pp

ORDER FROM: Gordon Press, P.O. Box 459, Bowling Green Station, New York, New York, 10004

02 177440
QUEUING MODELS FOR ESTIMATING AIRCRAFT FLEET AVAILABILITY
The availability of a small fleet of aircraft in a flying-base, repair-depot combination is modeled and studied. A deterministic flow model relates parameters of interest and represents the state-of-the art in the planning of such systems. A cyclic queue model shows the effect of the principal uncertainties in operation and repair and shows the consequent decrease in the availability of aircraft at the flying-base. Several options such as increasing fleet size, investments in additional repair facilities, or building reliability and maintainability into the individual aircraft during its life-cycle are open for increasing the availability. A life-cycle cost criterion brings out some of these features. Numerical results confirm Rose's prediction that there exists a minimal cost combination of end products and repair-depot capability to achieve a prescribed operational availability.

Sarma, VVS (Indian Institute of Science) Ramchand, K Rao, AK *IEEE Transactions on Reliability* Vol. R-26 No. 4, Oct. 1977, pp 253-256

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

02 178116
THE DOMESTIC AIRLINE INDUSTRY
This book focuses on the domestic airline industry through a general background description and specific cases directed at the operating programs and policies of companies within the industry. The introductory note and glossary are designed to provide a general background for individuals who are unfamiliar with the industry, as well as define the use of terminology and provide reference material that will be useful in considering individual case studies. The major portion of the book describes actual company situations and management decision-making processes in case studies. The cases were selected to be representative of the vital decisions that influence the overall competitiveness of these firms. The approach of this book is to present an inside look at an industry through "situational analysis" rather than the more conventional "Theoretic construct" approach. The cases are divided in the following manner: Position within the industry-Southwest Airlines, United Air Freight. Technology Section-Braniff International, Flying Tiger Line. Operating Policy-Eastern Airlines December Schedule, Southern Airways, Federal Express Corporation, Part 1, Manning the Boeing B-737. Control-Canadian Pacific air passenger reservations. Managing change-Federal Express Corporation, Part II.

Wyckoff, DD (Harvard University) Maister, DH (British Columbia University, Canada)
Heath Lexington Books 1977, 191 pp, Figs., Tabs.

ORDER FROM: Heath (DC) and Company, Department RS, 125 Spring Street, Lexington, Massachusetts, 02173

02 178258
CHINA'S AIRLINE PROGRAM STILL MODEST, BUT GROWING
This article provides an overview of the People's Republic's national airline. The CAAC, the Civil Aviation Administration of China, combines the functions of national airline, airport operator and control aeronautical authority. The People's Republic joined the ICAO in 1974, and currently has air agreements with more than 30 countries. China's main aviation hub is Peking, and 36 of 77 inter-province flights originate there. It is noted that China will most likely develop a more extensive international network first before expanding demestic services significantly. CAAC's international jet transport fleet consists of around 50 aircraft and it is estimated that China will have to upgrade and modernize up to 50 airports in order to develop a modern air transportation system. Navigational facilities throughout China are believed to be rather limited. There are reports of aircraft being grounded because of the weather, and there is apparently very little flying at night. China has thus far failed to produce its own jet airliner or jet engine, and its military orientation is reflected in the fact that most Chinese aircraft production is concentrated on jet fighters and bombers. China has increased its purchase of Western aircraft considerably including preliminary orders for three Concorde SST's. From recent sales to China, it would appear that availablility rather then ideology are controlling factors in CACC's purchases.

Szuprowicz, BO *Air Transport World* Vol. 15 No. 5, May 1978, pp 38-42, Phots.

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

02 178456
THE PROBLEMS OF TRANSPORTATION PLANNING AND AREA PLANNING IN URBAN CONURBATIONS [Probleme von Verkehrsplanung und Raumplanung in Ballungsgebieten]
The origins of transportation problems are examined with reference to the following aspects: (1) the present situation regarding lack of training (of architects and civil engineers); (2) the lack of understanding of transportation planning (the conflicts that exist between politicians and planners); (3) insufficient data; (4) the legal situation (unclear regulations, the division of legal rights); (5) the chronological transference of resolutions (keeping proposed routes free of development, urban structure comes before infrastructure); (6) the lack of compatibility between transportation planning decisions and changes in structure. In actual cases the known deficiencies are discussed relating to private and public transport and public action groups and the lack of information the population has. Prerequisites to the success of a transportation planning analysis are comprehensive data and qualitatively proportionate analyses of parallel transportation plans. As a step in the planning stage of a prognosis it is shown that a present possible practiced method of approach for transportation planning is the processing of variants which serve as a basis for establishing a range of decision areas. /TRRL/ [German]

Knoflacher, H (Technical University of Vienna, Austria) *SIR-Mitteilungen und Berichte* No. 1, 1977, pp 29-41

ACKNOWLEDGMENT: TRRL (IRRD-306489)
ORDER FROM: Salzburger Institut fuer Raumforschung, Postfach 2, Salzburg, Austria

02 178732
COMPUTERS IN AIRLINE SERVICE: AN EVER WIDENING RANGE OF APPLICATIONS
This article summarizes the evolution of airline computer systems from the late 1950s and 1960s when airlines were among the first users of real time systems to the present. In general, systems are used for such applications as reservations, maintenance management, accounting, flight planning, and message switching. In the begining, airlines tended to develop their own tailor-made systems, with little attempt at industry-wide cooperation. In recent years, this approach has proven to be extremely un-cost-effective, so the trend is now toward use of more generalized airline applications software packages and toward greater cooperation among airlines. The computer systems of three airlines are described. Lufthansa's reservations system, utilizing Univac equipment, was developed entirely in-house. Because of the custom-made nature of its system, the airline has not been as active in marketing its expertise as some other carriers, although it has sold some of its software to other users. In contract, KLM, a smaller carrier, purchased software from other IBM users while developing some in-house. In turn, it has been selling its system to other users. As an example of a large airline using less specific software British Airways has been able to offset the consiberable expense of merging the separate computer systems of BOAC and BEA by taking advantage of being one of IBM's first non-US customers and selling its expertise to a large and varied list of clients (including 46 airlines-8 in the US), accumulating more revenue from this activity than any other carrier. As far as the future is concerned, it will probably be more in the direction of refinement of existing systems, rather than any wholesale

change-over, although a shift to the newer decentralized systems is possible.

Tallon, P *Interavia* Vol. 33 May 1978, pp 507-512

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

02 179304
INTERNATIONAL CIVIL AVIATION, THE ICAO ANNUAL REPORT 1977

This annual report highlights the major trends in international civil aviation for 1977. International airlines of the ICAO performed a total of some 435 billion passenger-kilometers in scheduled and non-scheduled operations throughout the world during 1977. A decline is noticed in the proportion of total international passenger traffic carried on non-scheduled services. In scheduled services, there was a seven-percent increase over 1976. Financial results indicate an increase (13%) in operating revenues of scheduled airlines; for non-scheduled airlines, revenues also increased 13%. Safety records for scheduled service was only slightly short of the best record (1975). The figures were worse for non-scheduled services performed with larger aircraft. Obtaining fares and rates agreements in 1977 proved to be more troublesome than in previous years. Fewer problems were encountered in obtaining cargo rates agreements. Commercial aircraft orders continued to climb for the second year. The financial commitment for new jets ordered is estimated at about US $5.7 billion. Continued efforts are being made to improve aviation energy efficiency, support services and flight safety. ICAO technical assistance expenditures for 1977 were lower han the previous year, however, based on a number of large scale projects approved last year, a significant increase in funding is anticipated for 1978.

ICAO Bulletin Vol. 33 No. 5, May 1978, pp 23-67, 18 Tab.

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

02 180133
MATHEMATICAL PLANNING AND BULK SERVICE METHODS OF CIVIL AVIATION--RUSSIAN BOOK

The book deals with mathematical methods developed for deriving models that may be used to predict the course of a production or economic process and also to determine the best combination of factors to obtain optimum process efficiency. The models consist of mathematical formulas and algorithms which describe a given process and permit evaluation of the relevant characteristics of the process. A brief historical review of the development of such mathematical methods is followed by discusssions of the principal theories involved in the development and application of the mathematical models. Particular attention is given to queueing theory, regression theory, and mathematical programming. Applications of the theories to civil aviation are examined. [Russian]

Andronov, AM Khizhniak, AN
Izdatelstvo Transport 1977, 216 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-13000)
ORDER FROM: AIAA

A78-13000

02 180154
THIRD LEVEL AND REGIONAL AIR TRANSPORT

The "third level operations" considered are related to scheduled services involving the use of aircraft with less than 50 seats on low frequency and/or low density routes. It is estimated that domestic third level operations in the UK comprise, on the basis of seat capacity, from 1 to 2% of the total UK scheduled air operations. Attention is given to third level operations in the UK, the problems and prospects of French supplementary air carrier operations, questions of route licensing and operations, the market for small airliners to the early eighties, the characteristics of the "third level" as a complex market sector, and the development and operation of airports in the third level and regional context.

Proceedings of a Symposium, London, England, 23 February 1977.

Aeronautical Journal Proceeding 1977, 93 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-36574)
ORDER FROM: AIAA

A77-36574

02 180170
THE AUSTRALIAN AIR TRANSPORT SCENE--NOTES ON A VISIT TO THE FIFTH CONTINENT

The characteristics of the Australian air transport industry are related to the great distances between Australia and the other continents, the relation between the vastness of the national territory and the small population of the country, and the concentration of 80% of this population within 10% of the territory. Attention is given to the cost recovery conflict with respect to the costs of the air transport infrastructure, problems concerning the biggest airport of the country, the necessity to build a new runway for Sydney, the Airports for Melbourne and Canberra, the two airline policy regarding Australia's domestic air transport, the state-owned international airline Quantas, financial problems for air navigation services, a step-by-step ATC expansion, and the capabilities of the Australian Electronic industry.

Mama, HP *Airport Forum*

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41377)
ORDER FROM: AIAA

A77-41377

02 180181
INTERNATIONAL FEDERATION OF OPERATIONAL RESEARCH SOCIETIES SYMPOSIUM

The application of operations research to such problems of airline management as control of airport congestion, fleet planning, schedule elaboration and seat allocation, aircraft maintenance programs, fuel optimization, flight crew, cabin crew and reservations personnel management and procurement cost allocation, is discussed. Topics of the papers include the reduction of airport congestion by use of optimal runway configurations, an algorithm for planning short-haul aircraft fleets, the application to scheduling of a stochastic model of transportation demand, the management of spare-part inventories, a simulation of an aircraft maintenance program, short-and long-term fuel allocation planning, staffing of reservation and maintenance facilities, recruiting and training of pilots and development of cabin attendant work schedules.

Proceedings of a Symposium held at Key Biscayne, Florida, 26 September-1 October 1976.

International Federation of Operational Res Soc Proceeding 1976, 558 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-46785)
ORDER FROM: AIAA

A77-46785

03 080636
STRUCTURAL ANALYSIS OF FLEXIBLE AIRFIELD PAVEMENTS
The elastic moduli of pavement materials of conventional flexible airfield pavements are evaluated based on behavior pattern inherent in the CBR equation. This is based on the principle that a pavement designed by the CBR equation should have a thickness sufficient to prevent shear failure in the subgrade soil and thus two pavements designed by the CBR equation for the same load repetition level would experience approximately equal shearing strains at the surface of the subgrade soils. The computed maximum shearing strains are correlated with the performance of many full-scale accelerated traffic test section for both single-wheel and multiple-wheel assemblies, and their applications to design of pavements and evaluation of mixed traffic and overlays are illustrated.

Ahlvin, RG Chou, YT Hutchinson, RL (Waterways Experiment Station) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE3, Proc. Paper 10727, Aug. 1974, pp 625-641, 10 Fig., 4 Tab., 10 Ref., 2 App.

ORDER FROM: ESL

03 080640
DYNAMIC RESPONSE OF AIRPLANES IN GROUND OPERATION
This investigation deals with deterministic and stochastic analyses of dynamic response of airplanes to runway uneveness. After a brief review of various methods for runway uneveness representation, a new approach of power spectral representation of sectional ergodic runway is presented. This new method, while keeping the computational expediency of power spectral density techniques, has the important feature that the local uneven nature of runways can be revealed. Two complementary approaches are used to obtain dynamic response. They are time-history analysis and power spectral analysis. The mathematical idealization of airplanes used in analysis can take account of the nonlinear behavior of the landing gear systems and the flexural nature of the free-free airframe. The analysis of the dynamic response of the Boeing 707 airplane to a severely uneven runway is taken as an example solution in order to illustrate some applications of the methods. Finally, some of the more significant findings of this investigation are summarized.

Hsueh, T Penzien, J (California University, Berkeley) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE3, Proc. Paper 10755, Aug. 1974, pp 743-756, 15 Fig., 5 Ref., 2 App.

ORDER FROM: ESL

03 125150
THE EFFECTS OF SPRING THAW SUBGRADE CONDITIONS ON THE LOAD-CARRYING CAPACITY OF FLEXIBLE AIRFIELD PAVEMENTS IN COLD REGIONS
The greatest variation in the bearing capacity of a flexible airfield pavement occurs in pavements on frost-susceptible subgrades where frost penetration is deep. The very high bearing capacity in winter, due to frost, changes to a very low value during the spring thaw when the top of the subgrade is saturated. A study was made of seasonal variations in the strength of a normal flexible runway pavement in scandinavian climatic conditions. Based on deflectometer tests, the strains in pavement and subgrade were computed and the annual "failure ratio" for different seasons and loads calculated; this is the ratio of the number of strain applications due to repetitions of the same load, to the total number causing fatigue failure. The two important conclusions to be drawn from the results are that 1. If bearing capacity is expressed by one single safe load applicable for the whole year, then this load is very greatly dependent on the failure ratio: 2. If safe load for the spring thaw period is made lower, then that for the remainder of the year can be considerably increased. The latter method will lead to greater utilisation of flexible pavements in cold regions. /TRRL/

Oerbom, B
National Swedish Road & Traffic Research Institute R&D Rept. No. 60A, 1975. 16 pp, 3 Fig., 3 Tab., 7 Ref.

ACKNOWLEDGMENT: National Swedish Road & Traffic Research Institute, TRRL (IRRD 213089)

03 125365
ROADWAYS AND AIRPORT PAVEMENTS
Modern paving techniques used on highway pavements, city streets, airport paving, and overlays are covered in this symposium. Examples of some outstanding research work are exhibited in several papers: a systematic study by the State of Indiana of continuously reinforced concrete pavements which have developed some premature distress, work that the Corps of Engineers has done on airport pavements under simulated aircraft gear loads, and Canadian work to evaluate the performance of steel fiber reinforced concrete slabs on grade. Maintenance procedures discussed are methods of removing unsound concrete and placing a concrete patch, and a method of effecting fast pavement repairs.

American Concrete Institute SP-51, 1975, 296 pp

ORDER FROM: American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan, 48219

03 128249
PAVEMENTS AND SURFACINGS FOR HIGHWAYS AND AIRPORTS
This book introduces the basic principles which must be known in dealing with pavements, and presents the theories and methods of pavement design. There are four parts, the first of which covers pavement types, loads, climate effects, subbases and stabilized soils. The second part deals with the methods of design and construction of flexible pavements for highways and airports, and how to analyze their costs. Part three is devoted to a similar discussion of modern and conventional rigid pavements of different types. Part four explains the methods of pavement rehabilitation, the design of overlays and pavement systems analysis. Design charts are included in the various chapters, along with carefully selected and solved examples to illustrate the procedures and methods of design. The book is written for professionals and researchers as well as people familiar with basic engineering courses.

Sargious, M (Calgary University, Canada)
Wiley (John) and Sons, Incorporated 1975, 619 pp, Figs., Tabs., 7 App.

ORDER FROM: Wiley (John) and Sons, Limited, Baffins Lane

03 137765
PRELIMINARY RESEARCH WORK AND QUALITY CONTROL ON THE ZAGREB AIRPORT RECONSTRUCTION [Prethodni istrazni radovi i kontrola kvalitete izvedbe radova na rekonstrukciji Aerodroma Zagreb]
The reconstruction and extension of the Zagreb airport runway has been worked out according to the technical documentation prepared by the Zagreb airport engineering experts in cooperation with the Civil Engineering Institute of Croatia. By the 390 M concrete pavement runway extension and the reconstruction of the existing part of the runway, the Zagreb airport has been qualified to accept the largest intercontinental planes which are in service today. The largest part of the construction work was the building of the asphalt and concrete pavement. The new asphalt pavement consists of the 12-18 cm base course, 5 cm binder course and 4 cm wearing course. The reconstruction of part of the runway has been undertaken by using a 28 cm concrete course on top of an asphalt levelling course and the extension of the runway consists of the 33 cm concrete layer placed on the gravel protection layer. Quality control and laboratory examinations have shown that all the asphalt and concrete work was done in accordance with the technical terms and standards. /TRRL/ [Serbo-Croatian]

Babic, B Eres, M Halavanja, I Lamer, M Petrak, D *Ceste i Mostovi* Vol. 21 No. 11, Nov. 1975, pp 299-309, 10 Fig., 35 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-219537)

03 141509
THE APRON AND TERMINAL BUILDING PLANNING REPORT
This document presents planning recommendations for terminal building areas and apron space. The apron and terminal building areas are defined as those areas included and limited by the curb roadway and associated parking on the landside and taxiway access to the apron on the airside. The principal areas presented are: apron, connector, terminal, curb roadways and parking. Space considerations are presented as they are affected by the four principal concepts and airport traffic volumes, types and station characteristics. A presentation of area and layout for all major elements of the terminal building is illustrated in tabular, graphic and plan formats. Sources of planning information and guidance for the procurement and input of this information are provided. Gross terminal sizing recommendations for medium and long-range planning are presented. Comparative costs for on and off airport projects are discussed.

Parsons (Ralph M) Company, (RMP 5032-2) Final Rpt. FAA-RD-75-191, July 1975, 390 pp, 99 Fig., 9 Tab., 7 App.

Contract DOT-FA-72WA-2950
ORDER FROM: NTIS
AD-A018120

03 141844
POROUS FRICTION SURFACE COURSE
A study was conducted on the use of porous friction courses for airport pavements as a means of alleviating aircraft hydroplaning. The study consisted of laboratory investigation of material requirements and mix design development and a field study of construction control, construction processes, and long-term performance. The laboratory results were correlated where possible with the field observations. Satisfactory performance was obtained with a recommended aggregate gradation. A procedure for obtaining a design asphalt content and field mixing temperature, minimum field permeability values, and laboratory procedures for conducting permeability tests are described. A standard recommended guide specification is also included as an appendix.

Research was sponsored by the FAA, Systems Research and Development Service, under interagency agreement.

White, TD
Waterways Experiment Station, (FAA-RD-73-197) Intrm Rpt. Misc Paper S-75-12, Feb. 1975, 117 pp, 76 Fig., 11 Tab., 37 Ref., 1 App.

Contract DOT-FA71WAI-218

ORDER FROM: NTIS
AD-A009012

03 142572
RECOMMENDED DESIGN FOR RIGID-FLEXIBLE AIRFIELD PAVEMENT JUNCTURES
A study was conducted on the performance of junctures between rigid and flexible airfield pavements constructed using present criteria. The study consisted of field inspections of 14 rigid-flexible pavement junctures at Williams AFB, Arizona, and Columbus AFB, Mississippi, and discussions of the performance of these junctures with Base Civil Engineering Office personnel. Of the 14 junctures studied, 4 have been repaired and are now in good condition, 1 is in good to fair condition, 1 is in only poor to fair condition, and 8 are in good condition. Although the junctures have performed generally well, the asphaltic concrete pavement portions have experienced some minor problems (namely, humping, transverse cracking, and surface depressions). From the problems associated with the junctures studied, it is recommended that the present design be revised slightly. A recommended revision of the design of rigid-flexible airfield pavement junctures is described. The revision involves use of expansion joints, increased thickness of the asphaltic concrete, and special rolling procedures for the asphaltic concrete binder and surface courses.

Odom, EC
Waterways Experiment Station, (DA-4A762719AT40/A2) Final Rpt. Misc Paper S-76-19, Sept. 1976, 27 pp, 1 Fig., 15 Phot.

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AD-A031351/0ST

03 142574
CLIMATIC EFFECTS ON AIRPORT PAVEMENT SYSTEMS; STATE OF THE ART
This state-of-the-art report reviews the climatic parameters important to airport pavement design, the methodology by which climatic parameters are used to predict pavement design parameters, and the methodology by which climatic parameters are incorporated into design procedures. Methods for predicting temperature and moisture conditions in the pavement system are discussed. Also the pavement distresses which result from temperature and moisture effects are reviewed. The report includes a comprehensive discussion of the methodology for assessing the influence of climatic parameters on the properties of the airport pavement materials. Probabilistic procedures for evaluating the influence of climate on pavement systems are described. In conclusion, a brief summary of methodologies which could be used to include climatic parameters in airport pavement design is presented.

Prepared for the Office of Chief of Engineers, U.S. Army, and the Federal Aviation Administration; also published as Report No. FAA-RD-75-196, under Inter-Agency Agreement No. FA73WAI-377.

Dempsey, BJ
Waterways Experiment Station Final Rpt. Contract Rpt. S76-12, June 1976, 285 pp, Figs., Tabs., Refs.

Contract DACW39-75-M-1651

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AD-A029422/3ST

03 147725
HORIZONTAL ELEVATORS AS DOWNTOWN PEOPLE MOVERS
Statistics suggest that a driverless, computer controlled horizontal elevator system properly applied to the downtown area will provide the capacity and availability to stand up to city demands and move people comfortably and safely between major city centers. The system which has demonstrated rider acceptance can be a positive force in reducing city traffic problems. The horizontal elevator system in Hillsborough County Aviation Authority terminal complex at the Tampa International Airport is briefly described as well as the Sea-Tac International Airport. At Miami International, the system consists of 2 trains each with 2 rubber-tired cars operating on a quarter-mile aerial roadway. At the Williamsburg Busch Gardens, a complete loop on the mile-and-a half track takes 5 minutes at a top speed of 30 mph.

Metropolitan Vol. 72 No. 6, Nov. 1976, pp 37-41, 4 Phot.

03 148422
CHARACTERISTICS AND UTILIZATION OF COARSE AGGREGATES ASSOCIATED WITH D-CRACKING
Primary considerations in the selection of materials for coarse aggregate are those pertaining to freeze-thaw durability and the development of D-cracking in highway and airfield pavements. Two aspects of the problem are of particular importance: moisture movements and critical saturation of the aggregate, and the response of the aggregate to cyclic freezing and thawing in concrete. Laboratory studies of coarse aggregates have indicated that nondurable materials are generally of sedimentary origin and may reach critical saturation when the concrete is in direct contact with either free water or capillary-held water. Absorption-adsorption and mercury intrusion studies have revealed differences in the pore structure of durable and nondurable materials, while laboratory tests of aggregates in concrete differentiate performance during freezing and thawing in line with field service records. The most feasible method of utilizing potentially nondurable aggregates is to reduce maximum particle sizes. The needed reduction can be determined from laboratory freeze-thaw tests and is found to vary with source. Gravel sources have the option of crushing oversize material or using naturally finer material to improve durability, while crushed stone sources may use alternatively selective quarrying to produce higher quality aggregates. Proper evaluation of aggregate materials is contingent on establishing laboratory procedures directed expressly to the problem of D-cracking.

This publication appeared in Living with Marginal Aggregates, STP 597, 1976, pp 45-58.

Stark, D
Portland Cement Association Rpt. No. RD047.01P, 1976, 7 pp, 11 Fig., 6 Ref.

03 148654
REPEATED-LOAD INDIRECT TENSILE FATIGUE CHARACTERISTICS OF ASPHALT MIXTURES
The determination of the fatigue characteristics of pavement materials is necessary for the design and evaluation of highway and airport pavements. This paper summarizes the findings of a study in which the controlled-stress, repeated-load indirect tensile test was used to investigate the fatigue characteristics of asphalt mixtures. The logarithmic relationships between fatigue life and both applied stress and initial mixture strain were evaluated and found to be linear. In addition, linear relationships were found between n sub 1 and the logarithm of K sub 1 for the strain-fatigue life relationships and between n sub 2 and the logarithm of K sub 2 for the stress-fatigue life relationships. The effects on fatigue life produced by load, asphalt content, aggregate type, and testing temperature are discussed. Fatigue life could not be estimated from only applied stress or stress difference; however, equations relating life to both the initial mixture strain and the stress-strength ratio were developed. From this study it was concluded that the repeated-load indirect tensile test is suitable for evaluating the fatigue characteristics of asphalt mixtures.

Adedimila, AS (Lagos University, Nigeria) Kennedy, TW (Texas University, Austin) *Transportation Research Record* No. 595, 1976, pp 25-33, 14 Fig., 1 Tab., 11 Ref.

ORDER FROM: TRB Publications Off

03 148721
STUDY OF A GROUND ACCESS SYSTEM FOR O'HARE INTERNATIONAL AIRPORT. PHASE II REPORT: EVALUATION OF CBD-O'HARE ALTERNATIVES

With the prospect of passenger enplanements increasing by over 50 percent by 1985, the City of Chicago recognized the need for conducting a comprehensive study of O'Hare's ground access system and retained Alan A. Voorhees & Associates, Inc. to prepare a regional access plan. The studies and analyses to be performed by AMV as part of the access plan development have been divided into three phases. This report presents and describes the work completed in Phase II of the study. Although Phase II, as originally conceived, was to produce a long-range access plan, regional in scope, it became clear during the course of the Phase II studies that an O'Hare-CBD access system would be the foundation and most significant element of the regional access system. Accordingly, AMV's efforts in Phase II focused on studies which would facilitate the selection of such a system, and this report presents the results of those studies exclusively. /GMRL/

Voorhees (Alan M) and Associates, Incorporated Jan. 1973, n.p.

03 149718
DETERMINATION OF THE THICKNESS OF RIGID PAVEMENTS AND RUNWAYS-GENERAL INTRODUCTION AND CRITICAL STUDY OF PAVEMENT DESIGN METHODS [Determination de l'epaisseur des chaussees et pistes rigides -introduction generale et critique des methodes de calcul]

The first part of this report consists of a general introduction to the problems involved in determining the thickness of rigid pavements and runways. The second part, which consists of three sections, deals with the theories of Westergaard and associated theories: they constitute the first phase of a study in progress of pavement design methods. Chapter 1 reviews the hypotheses which are the basis of Westergaard's theories and gives the formulae for stresses and deflections for three typical cases of loading under a single static load. Chapter 2 is devoted to the critical analysis of Westergaard's theory and hypotheses. The modifications made to these formulae, as a result of experimental work, are indicated. The case where the tyre-road contact area is in the form of ellipse is treated also. Chapter 3 is devoted mainly to a discussion of the most unfavourable loading case: some remarks are added on values arising in practice. The appendices contain two charts, which are complementary to the demonstration of Westergaard's formulae, as well as tables of numerical values. /TRRL/ [French]

Reichert, J
Road Research Centre, Belgium Monograph Report No. 27/J, Jan. 1975, 112 pp, 6 Fig., 5 Tab., 54 Ref.

ACKNOWLEDGMENT: Road Research Centre, Belgium, Road Safety Study and Research Fund, Belgium, Central Laboratory of Bridges & Highways, France, TRRL (IRRD 103599)

03 152365
CONDITION OF RUNWAYS AT AIRPORT MAPPED BY AERIAL IMAGERY TECHNIQUE AT LOW COST

Technology for inexpensive monitoring of the condition of runways at both civilian and military airports, using aerial imagery, has been demonstrated by Calspan. The technique involves comparison of the red and blue reflectance of the surface area. The new method has been used to map extensive cracking of taxiways and runways at Thule Air Base. The survey correctly predicted both the runway cracking and deterioration found by profilometer traces along the runway, and the flow of subsurface moisture verified by eight borings made in the main runway area for the Air Force Systems Command. Patterns of subsurface drainage in the soil surrounding the runway also were shown. The analysis was done on a unique photointerpretation console designed and built by Calspan for the Rome Air Development Center. The company has equivalent equipment at its Advanced Technology Center in Buffalo for civilian projects. One advantage of aerial imagery is that the data can be gathered without interfering with landing and takeoff traffic. /ART/

Calspan News Analytic No. 16, Feb. 1977, p 2

03 154317
LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION. REPORT 17-8. RESULTS OF NUMERICAL TIME-DEPENDENT, THREE-DIMENSIONAL, STORM SURGE ANALYSIS. MAIN TEXT AND APPENDIXES A-F

The storm surge in Lake Erie in particular along the shoreline from Lorain, Ohio to Fairport, Ohio has been studied for existing conditions and as modified by a proposed jetport island located approximately four miles offshore near Cleveland, Ohio. This report includes data from numerical simulations of storm surge and three-dimensional, time-dependent horizontal velocity regimes associated with interpreted wind fields for storms of 8-9 April 1973, 25-27 November 1950 and 7-10 November 1913. In the study, the lake is assumed to be isothermal (constant density) and solutions are obtained for the entire lake and for a nearshore area near Cleveland. The report primarily presents the results of numerical simulation of storm surges, briefly summarizes the hydrodynamic model used and succinctly presents interpreted wind fields of the selected storms. Included in the data are vector plots of interpreted wind velocity over the lake, contours of surge elevations for entire lake and nearshore region, time history plots of surge elevations at selected points and vector plots of horizontal velocity at various depth levels in the nearshore region. Difference in surge elevations and horizontal velocity in the nearshore region with and without the jetport island are presented. Results of the study based on numerical simulation of storm surge in Lake Erie indicate that the effect of the jetport island on storm surge is locally confined around the jetport island and along approximately 10 miles of shoreline in the immediate vicinity of the jetport. These jetport effects are minimal with surge increases of 5 to 30 percent around jetport and 1 to 5 percent along the shoreline.

See also Rept. no. 17-7 dated Feb 76, AD-A036 242.

Durham, DL Butler, HL Raney, DC
Waterways Experiment Station WES-MP-H-76-3-8, Oct. 1976, 388 pp

ACKNOWLEDGMENT: NTIS
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AD-A036243/4ST

03 154318
LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION REPORT 17-7. RESULTS OF NUMERICAL STEADY-STATE, WIND-DRIVEN CIRCULATION ANALYSIS. MAIN TEXT AND APPENDIXES A-C

The wind-driven, steady-state, well-mixed circulation in Lake Erie has been studied for existing conditions and as modified by a proposed jetport island located near Cleveland, Ohio. The report includes data from a parametric study for wind speeds of 17 mph and 35 mph representing average and extreme wind conditions from late September through May. In the study, the lake is assumed to be isothermal and a solution is obtained for the entire lake and for a nearshore area near Cleveland. The report primarily presents the results of the circulation study and briefly summarizes the hydrodynamic model used. Included in the data are stream function contours, horizontal and vertical velocities at various depths for the entire lake and for the nearshore area. Also included are differences in velocity components and in velocity magnitude with and without the jetport island included in the study. Among the conclusions of the study based on the results of the parametric study were that the effect of the jetport island on lake circulation is not appreciable except within 2 to 3 miles of the island and that the larger wind speed resulted in a slight increase in the surface area over which velocity perturbations were found and an increase in intensity of those perturbations very close to the island. (Author)

See also rept. no 17-8 dated Oct 76, AD-A036 243.

Durham, DL Butler, HL
Waterways Experiment Station WES-MP-H-76-3-7, Feb. 1976, 743 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A036242/6ST

03 154702
AIRPORT SUITABILITY REPORT. FIFTEEN MAJOR DOMESTIC U.S. AIRPORTS

This document was prepared as a part of the Supersonic Transport (SST) contract. The objective was to evaluate the suitability of fifteen selected domestic U. S. airports to accommodate the Boeing 2707. The various compatibility aspects of the study were calculated and results superimposed

over aerial photographs of the various airports and their terminals. Cost estimates necessary to upgrade the airports to a state of minimum compatibility with the SST are also displayed.

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Headquarters. Distribution limitation now removed.

Boeing Company D6A10582-1, Dec. 1967, 243 pp

Contract FA-SS-67-3

ACKNOWLEDGMENT: NTIS
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AD-825325/4ST

03 154898
SATELLITE AIRPORTS: ANALYSIS OF DEVELOPMENT POTENTIAL

This report provides an analysis of the potential for developing satellite, or secondary airports in major metropolitan areas, and an estimate of the benefits satellite airport development might provide. Approximately 365 satellite airport candidates were identified in the 23 largest metropolitan areas (large hubs). These airports have the capacity to support additional air traffic which might be diverted from the larger more congested air carrier airports in each area. Maximum utilization of these satellite facilities could maintain aircraft congestion and delay at the top 25 airports at or below 1975 levels for up to 15 years. While the analysis shows there is additional capacity available at satellite airports, there appear to be insufficient incentives at present for aircraft operators in use these facilities.

Fromme, WR
Federal Aviation Administration Final Rpt. FAA-AVP-77-67, June 1976, 154 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A036893/6ST

03 157468
ASPHALT IN AIRPORT CONSTRUCTION: DESIGN AND MIX COMPOSITION [Asphalt im fluaplatzbau; bemessung und mischgutzusammensetzung]

The stresses in runways, taxiways and airfield aprons, the design according to empirical and analytical-empirical methods, and the advantages of asphalt pavements are described. Over 50% of the runway surfaces in the German republic are paved with asphalt. Examples of the construction of runways are presented. The composition of the asphalt mixes is extensively discussed. Because of the inadequate re-compaction by the traffic, the regulations valid for highway construction may not be employed. /TRRL/ [German]

Schoenian, E (Deutsche Shell AG, West Germany)
Forschungsgesellschaft fuer Strassenwesen, Austria Analytic Publication No. 58, No Date, pp 3-18, 18 Fig., 6 Tab., 2 Phot., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 304282)

03 157836
PARKING REVENUE CONTROL

This report which describes some of the fundamentals of equipment and procedures in planning a new parking facility or establishing a good system of control in an existing one, also covers parking meter revenue security and control. The basic elements of revenue control are listed, and general security concepts are noted. The operation of the ticket issue machine is described. The induction loop detector, treadles, the rubber road tube (for secondary locations), parking gates, time clocks, master clock, fee indicator, and differential counters are also described. Audit procedures are discussed, and the planning of revenue control systems for airport, event parking, and retail/business parking is outlined. Comments are made with regard to security, vandalism, meter housing, the coin collection system, parking meter standard, maintenance, the keeping of records, and surveillance.

Transportation Research Circular No. 184, June 1977, 19 pp, 8 Fig.

ORDER FROM: TRB Publications Off

03 159054
ENVIRONMENTAL ASSESSMENT OF AIRPORT DEVELOPMENT ACTIONS

This report provides specific step-by-step guidance on the preparation of environmental impact assessment reports and statements for a full range of airport development projects in accordance with DOT/FAA, EPA, CEQ, and other regulatory and reviewing agency requirements. Instructional material is included which extends beyond existing guidelines which focus on what impacts to consider. This report is designed to explain how each potential impact should be approached, analyzed, referenced, and presented. Included in this text are instructions of how to collect and analyze environmental impact data, so as to provide clear, responsive documentation in conformance with specific Federal, state, and local laws and regulations. Also included are all steps of the study and review process including assessment methodologies and report preparation, public hearing presentation, responses to comments raised by reviewing agencies and the general public, and final statement preparation.

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AP-77-1, Mar. 1977, 369 pp

Contract DOT-FA75WA-3703

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A039274/6ST

03 159058
FAA AIRPORT CAPACITY AND DELAY MODELS. MODEL SIMULATION

The tape contains the following programs developed for the FAA: airport capacity model; airport delay simulation model; and airport annual delay model. The airport capacity model computes saturation hourly runway, taxiway, or gate capacity given inputs for runway use configuration, weather, aircraft mix, percent arrivals, aircraft separations, taxiway locations, gate sizes, etc. This information can be used to determine the ultimate flow rate possible on an airport, and to develop inputs required to compute hourly and annual airport delay. This program can be used with cards (i.e., batch inputs) or in a simplified question and answer on-line mode. The program contains subroutines to compute hourly capacity for over 100 runway use configurations. The airport Delay Simulation Model computes detail information about aircraft delays, travel times, flow rates, and queues on the airport airfield and terminal airspace. Model inputs include a schedule of aircraft operations, taxiway routings, aircraft separations, locations of airline gates and general aviation basing areas, aircraft performance measures, etc. A separate preprocessor is available to simplify the preparation of routing data inputs. The airport Annual Delay Model computes annual delay for the airport airfield given inputs for hourly runway capacity, usage percents for different runway use configurations, annual demand, demand distribution characteristics, weather data, etc. This information can be used to forecast future airport congestion and select reasonable annual capacities. This program can only be used in a question and answer mode.

Availability: Source tape is in EBCDIC character set. Tape(s) can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density and parity. Call NTIS Computer Products if you have questions. Price includes documentation. AD-A033 685 and AD-A036 354.

Ball, CT
Federal Aviation Administration FAA-RD-77-45, FAA/DF-77/001, Apr. 1977, n.p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A039305/8ST

03 159064
ENVIRONMENTAL ASSESSMENT OF AIRPORT DEVELOPMENT ACTIONS. APPENDIX VOLUME

This volume supplements the principal report--Environmental Assessment of Airport Development Actions. It contains copies of pertinent laws, regulations and orders including the National Environmental Policy Act, CEQ Guidelines, and the FAA order on processing airport development actions affecting the environment. It includes information on the environmental assessment requirements of the various states. It provides specific data on aircraft noise and the impact of noise on people. This volume also contains pertinent reference material and guidelines on flood hazards, coastal zones, air quality, relocation, protection of historic and cultural resources, and prime and unique farmland. (Author)

Appendix to AD-A039 274.

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AP-77-1A, Mar. 1977, 350 pp

Contract DOT-FA-75WA-3703
ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A039465/0ST

03 159130
A STUDY OF AIRCRAFT TOWING AS PROPOSED FOR BOSTON-LOGAN INTERNATIONAL AIRPORT

The purpose of this study was to analyze the impact of the proposed revisions to airport rules at Logan International Airport regarding ground movement of aircraft by towing in lieu of taxiing in selected areas. Impacts in the areas of safety, economics, capacity, and environment were major considerations. The methods used in this study varied depending upon the subject matter under review in the areas of (1) safety--historical data from operating airlines was reviewed, (2) economics--previous economic data regarding the adjacent neighborhoods was evaluated and compared, (3) capacity--actual experience of an involved airline was used, and (4) environment--readings of noise were made under operational conditions. The results of this study are: (a) the proposed extended towing is hazardous; and (b) it raises problems in communications, creates congestion, exposes ground personnel to jet blast, and passengers standing in aisles to possible injury. The conclusions are that additional studies of these impacts should be made before these proposed revised rules are made mandatory at Logan International Airport. (Author)

Prepared in cooperation with Unified Industries, Inc., Alexandria, Va. Availability: Microfiche copies only.

Gellman Research Associates Incorporated FAA-AEQ-77-5, Mar. 1977, 257 pp

Contract DOT-FA77WAI-728

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040102/6ST

03 163668
DEVELOPMENT OF OPEN TEXTURED BITUMEN MACADAM FRICTION COURSE FOR AIRPORTS IN GREAT BRITAIN

This friction course material has been successfully used in both military and civil aerodromes in the U.K. and abroad catering for high speed aircraft where operations call for a high quality, durable, all weather surface largely free from maintenance during its serviceable life. The material specifications state that the aggregates shall be crushed rock of the following groups as classified in BS 812: Granite, Basalt, Gabbro, Hornfels or Porphyry; when tested in accordance with BS 812 its flakiness index shall not exceed 25%, crushing value 16% and water absorption 1.5%. It shall also be subjected to test for soundness and stripping of binder. Details relating to the percentage of fines, binder, and minimum thickness of course are also covered. Comments are made on the preparation of the pavement surface, quality control, maintenance, and benefits of the friction course. The friction course subjected to fuel spillage should be flushed down with water as soon as possible. Repairs to damaged areas should be undertaken with due regard for the sub-surface drainage to the runway with different binders are discussed and current studies are listed.

Proceedings of International Symposium on Porous Asphalt, Amsterdam, Netherlands, May 31 to June 2, 1976.

Hutson, RM (Department of the Environment, England)
Study Centre for Road Construction, Netherlands Proceeding S.C.W. Record 2, 1977, pp 41-47, 1 Fig.

ACKNOWLEDGMENT: Study Centre for Road Construction, Netherlands
ORDER FROM: Study Centre for Road Construction, Netherlands, 14a Jansbuitensingel, Arnhem, Netherlands

03 164053
STUDY OF NIGHTTIME PAVEMENT CONSTRUCTION PRACTICES--ASPHALTIC CONCRETE

The magnitude of scheduled airline operations at civil airports has made it imperative that runway repair and overlay with hot mix asphaltic concrete be accomplished at night so as not to interfere with normal airline flight schedules. Technical data and recommended construction practices such as working hours, construction lighting, automatic grade control, standby equipment, compaction, construction of transition and other related items are discussed in this study. Experiences of nighttime overlay construction at seven (7) municipal airports are documented in an appendix.

Sponsored by the Department of Transportation, Federal Aviation Administration.
Wills, WP
Wills (W.P.) Consulting Engineers Final Rpt. FAA-RD-76-221, Dec. 1976, 84 pp, 4 Fig., 3 Ref., 3 App.

Contract WI-75-5550-1

ORDER FROM: NTIS

AD-A041265/0ST

03 164268
OPTIMUM AIRPORT TERMINAL LAYOUT PLANNING

This paper reports on the development of an heuristic algorithm for designing airport terminal layouts. Current practice of generating layouts depends heavily on past designs and intuition. No formal design method exists. This algorithm was devised to assist the designer quantitatively. The airport terminal is represented by a set of four types of components connected by a set of links. The components in turn are represented by equations of circles which are manipulated in accordance with the principles of analytic geometry. The result is a physical layout of each floor of the terminal building. Each layout is optimal in that total passenger movement is minimized.(a) /TRRL/

Braaksma, JP *Engineering Optimization* Analytic Vol. 3 No. 1, 1977, pp 1-15, 7 Fig., 5 Tab., 24 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-227428)

03 164298
SAAB SKIDDOMETER

The SAAB skiddometer, designed to measure runway friction and for possible future use on icy roads, has completed a year's testing. A fifth wheel lowered from the luggage compartment of a SAAB 99 car is connected to the normal (non-driven) rear wheels. Forces acting on the wheel and the distance travelled are fed to a digital computer, which is programmed to give integrated mean values for pre-selected sections of the runway as well as for the complete length. A dashboard read-out is provided and the information is also recorded on tape. SAAB claims a number of advantages of the skiddometer over previous equipment; installation in a fast car rather than a trailer allows aircraft landing speeds to be simulated more realistically, the runway is out of action for a shorter period, and the risk of jack-knifing is eliminated. The measuring equipment can be declutched and retracted when not required, allowing the car to be used for other purposes. SAAB estimates that some 1500 airports need continual access to runway friction-measuring instruments. /TRRL/

New Scientist Analytic Vol. 74 No. 1056, June 1977, p 648, 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 227395)

03 165169
COMPUTER-CONTROLLED USW RADIO COMMUNICATION SYSTEMS IN PUBLIC SHORT-DISTANCE TRANSPORT AND IN AIRPORT AUXILIARY SERVICES [Rechnergesteuerte UKW-Funkleitsysteme im Oeffentlichen Nahverkahr und fuer Flughafen-Kappa Orfelddienste]

The combination of a computer with a system for radiocommunication improves the economic use of public and in-plant means of transport. Two recently commissioned, units of different structure, are described to explain this system. [German]

Vosta, K *Elin-Zeitschrift* Vol. 29 No. 1-2, 1977, pp 52-62

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 165170
APPLICATION OF HEAT PIPES TO DEICING SYSTEMS

Recent studies and field installations indicate that the use of heat pipes for the collection and distribution of heat overcomes many of the problems associated with conventional pavement deicing systems. Heat pipes promise long life with high reliability and virtually no maintenance. The multiplicity of heat pipes which operate individually within the heating system provides total redundancy and eliminates system breakdown due to isolated failures. The high thermal conductance of the heat pipe gives it a distinct advantage over conventional deicing systems. This high thermal conductance permits substantial energy removal from low-grade (temperature) energy sources without additional work input. As a result, heat pipes are capable of extracting the heat energy contained in the volume of earth adjacent to the

pavement surface, thus eliminating the need for costly power sources. Also, the use of a low temperature heat source and distribution network minimizes the thermal gradients through the concrete and reduces the thermal stresses and resultant concrete cracking experienced with conventional high temperature systems.

Second International Heat Pipe Conference, Bologna, Italy, March 31-April 2, 1976.

Suelau, HJ (B & K Engineering, Incorporated) Kroliczek, EJ Brinkman, CP
European Space Agency Conf Paper ESA SP112, 1976, n.p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 165172
PROCEEDINGS OF THE PAVING CONFERENCE, 14TH, 1977
Proceedings include 14 papers that deal with bituminous, concrete and lightweight aggregate road and pavement building materials, testing and application of materials, and recycled pavement systems. Methods of road and soil stabilization are discussed. Selected papers are indexed separately.

Proceedings of the 14th Paving Conference, University of New Mexico, Albuquerque.

Martinez, JE (Univ of NM, Dep of Civ Eng, Albuquerque)
New Mexico University, Albuquerque Proceeding 1977

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 165224
PERFORMANCE OF CONCRETE PAVEMENTS SUBJECTED TO WIDE-BODY JET AIRCRAFT LOADINGS
During the period 1969 through 1973, three full-scale test tracks were subjected to accelerated traffic with load carts simulating the main landing gear configurations on wide-bodied jet aircraft. The performance studies included plain concrete, fibrous concrete, various construction joint systems, insulating materials, and several base or subbase types including a membrane encased soil layer. Results indicate the need for giving greater considerations to deflections and selection of joint type, use of filter courses or stabilized layers to improve performance on low-strength foundations, feasibility of strengthening existing keyed construction joints, and initial data on the improved performance of fibrous concrete as a paving material.

Proceeding of the American Concrete Institute Annual Meeting: Roadways and Airport Pavements, San Francisco, California, March 30-April 5, 1974.

Hutchinson, RL
American Concrete Institute Proceeding Paper SP 51-8, 1975, pp 135-139

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 165226
PRESTRESSED CONCRETE, A NATURAL FOR HIGHWAY AND AIRPORT PAVEMENTS
The paper gives the major characteristics of the prestressed highway pavements which have been built in the United States during 1971-73, together with reasons for their design features. Construction and prestressing data are cited for demonstration and research project of the Federal Highway Administration at Dulles International Airport; early-age slab movements and restraints, and performance observations of slabs over two years old. The paper describes the advantages of natural stress conditions existing in long pavement slabs, which counteract the maximum flexural traffic load tension stresses. Longitudinal prestress maintains these favorable stress conditions most effectively. Concrete and steel requirements in prestressed pavement and conventional highway pavement construction are compared, showing substantial savings of both concrete and steel in prestressed pavements, in addition to a better utilization of both materials by prestressing. Suitable criteria for design and construction of future prestressed highway and airport pavement projects are suggested.

Proceeding of the American Concrete Institute Annual Meeting Roadways and Airport Pavements, San Francisco, California, March 30-April 5, 1974.

Friberg, BF
American Concrete Institute Paper 71-11, 1975, pp 197-210

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 165960
AIRPORT ACTIVITY STATISTICS OF CERTIFICATED ROUTE AIR CARRIERS
This report furnishes airport activity of the Certificated Route Air Carriers. Included in the data contained in Table 6 are passenger enplanements, tons of enplaned freight, express, and mail. Both scheduled and non-scheduled service, and domestic and international operations are included. These data are shown by airport and carrier. Table 7 includes departures by airport, carrier and type of operation, and type of aircraft. (Author)

Prepared in cooperation with the Federal Aviation Agency, Washington, D. C.

Civil Aeronautics Board Semi-Annual Rpt., June 1976, 316 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A040210/7ST

03 165970
PIEDMONT TRIAD REGIONAL AIRPORT SYSTEM PLAN. VOLUME 1, PART VIII
The regional airport study analyzed the 11-county need for an improved and expanded airport system. The primary objectives of the Study were to: (1) prepare a plan that will grow as demand develops in the triad region (2) integrate the aviation plans with plans for other modes of transportation (3) coordinate air transportation with regional plans and protection of the environment. The plan establishes short (1-5 year) intermediate (6-10 year) and long range (11-20 year) requirements for future airport developments; costs of developing these facilities and implementation guidance. All the existing and proposed airports of the region are noted with recommendations for improvements required to meet aviation needs, in both air carrier and general aviation. (Author)

See also report dated 1 Jan 77, AD-A040 277. Original contains color plates: All DDC reproductions will be in black and white.

VTN Consolidated Incorporated Jan. 1977, 168 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A040276/8ST

03 165971
PIEDMONT TRIAD AIRPORT SYSTEM PLAN. SUMMARY
The airport system plan summary provides a background of the Piedmont Triad Regional Airport System Study and states its objectives. A description of the region follows with its present aviation facilities. Growth in general aviation activities is forecast and the airport expansion needs are calculated. Major development needs and costs are arranged in tables. (Author)

See also report dated Jan 77, AD-A040 276.

VTN Consolidated Incorporated Jan. 1977, 13 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A040277/6ST

03 166060
AIRPORT FACILITY QUEUING MODEL VALIDATION
Criteria are presented for selection of analytic models to represent waiting times due to queuing processes. An existing computer model by M.F. Neuts which assumes general nonparametric distributions of arrivals per unit time and service times for a single service was envisioned as best fulfilling requirements. Data obtained from Denver Stapleton Airport were applied to this model. Service times and arrival rates at an express baggage check facility, a security station, and a gate were used as inputs. Delay times corresponding to the observed arrival rates were recorded and compared to model outputs. Using the T-test, agreement was obtained at the 5 percent level of significance for the mean values of the first two facilities. Predictions of waiting time distribution, however, did not pass the Kolmogroff test at the same level of significance. Discrepancies are due to a lack of time resolution in arrival times and the application of this model to multiserver situations. (Author)

Yuan, LS McCabe, LJ
Transportation Systems Center Intrm Rpt FAA-AEM-77-4, TSC-FAA-77-2, May 1977, 49 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041258/5ST

03 166065
STRUCTURAL DESIGN OF PAVEMENTS FOR LIGHT AIRCRAFT
This report presents structural design criteria for airfield pavements to be used by light aircraft; i.e., those with gross weights less than 30,000 lb. Presented are criteria for conventional flexible and rigid pavements, for rigid and flexible pavements containing stabilized layers and membrane-encapsulated soil layers, and for unsurfaced areas; a cost-benefit analysis; and a construction guide for thin concrete pavements. (Author)

Ladd, DM Parker, FJ Pereira, AT
Waterways Experiment Station Final Rpt. FAA-RD-76-179, Dec. 1976, 81 pp

Contract DOT-FA75WAI-526

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041300/5ST

03 166069
FIELD COMPACTION OF BITUMINOUS MIXES FOR AIRPORT PAVEMENTS
The report identifies the rationale for the Federal Aviation Administration requirement concerning the compaction of bituminous airport pavements (98 percent minimum of Marshall density) and outlines the mix design and construction factors directly affecting pavement compactibility. Information on the practices and problems associated with field compaction was gathered from interviews with cognizant field staff and notable experts, laboratory and field records of recently constructed airport pavements and from experimental and analytical research efforts by several agencies. The findings are that the requirement is justifiable on the basis of expected pavement strength and durability; and that if certain design, construction and testing procedures are not within strict limits difficulty or failure to achieve adequate compaction will result. Recommendations are made that will assure and facilitate the attainment of high quality pavements. (Author)

McLaughlin, AL
Federal Aviation Administration Final Rpt. FAA-RD-77-42, Apr. 1977, 63 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041335/1ST

03 166088
REPORT ON AIRPORT CAPACITY: LARGE HUB AIRPORTS IN THE UNITED STATES
This report describes an airport capacity analysis recently completed for the large hub airports of the United States. A total of 104 airports, including thirty major air carrier airports, were evaluated. Information was collected on existing and planned airport capacities and facilities for the airport airside, terminal, and landside components. Data on ticket counters, curb frontages, baggage claim devices, security checkpoints, parking, gates, runways, and many other items were obtained. This report describes the study motivation, data sought, survey methodology, and data sources. Preliminary findings of the study and outlines for future applications for the data collected are also discussed. Actual data obtained from the airports are included within the report. (Author)

Gentry, DE Howell, JD Taneja, NK
Aerospace Systems, Incorporated Final Rpt. FAA-AVP-77-26, May 1977, 800 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041435/9ST

03 166091
DEVELOPMENT OF A PAVEMENT MAINTENANCE MANAGEMENT SYSTEM. VOLUME I. AIRFIELD PAVEMENT CONDITION RATING
This report describes the development and verification of a pavement condition index (PCI) for rating the condition of jointed concrete and asphalt-or tar-surfaced airfield pavements. The PCI, which measures airfield pavement structural integrity and surface operational condition, is calculated based on measured pavement distress types, severities, and densities obtained during an inspection of the pavement. Volume II of this report presents distress types, descriptions, severity levels, and measurement criteria for use in performing the pavement inspections. The PCI has been field tested and validated through the assistance of many airfield pavement engineers at nine airfields (over 100 pavements) located in widely different environments and subjected to different traffic conditions. Field tests indicated that the computed PCI compares well with the mean rating of experienced pavement engineers. The PCI was found to be much more consistent than the individual subjective ratings, since it is based on measured distress data. Preliminary guidelines for determining maintenance and repair needs based on the PCI are also presented. (Author)

Shahin, MY Darter, MI Kohn, SD
Army Construction Engineering Research Laboratory Final Rpt. CERL-TR-C-76-Vol 1, AFCEC-TR-76-27-Vol-1, Nov. 1976, 223 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041461/5ST

03 166476
RESEARCH IN AIRPORT PAVEMENTS
At the request of the Federal Aviation Administration, the Transportation Research Board conducted a conference on research in airport pavements to present the findings from recent research activities by FAA, to invite comments on the conclusions from these findings, and to address areas of future research needs. Based on presentations and discussions at the conference, research results that can now be implemented are in the following areas: (a) The pavement-aircraft compatibility study provides a basis for trade-offs between aircraft and pavement design; (b) aircraft distribution on airport pavements can be resonably defined for design and rehabilitation purposes; (c) mix design and construction procedures for fibrous concrete are adequate to permit its use where appropriate; (d) mix design and construction procedures are adequate for porous friction courses and performance data demonstrate their suitability for in-service use; (e) suitable equipment and procedures are available for measuring pavement unevenness; and (f) statistical quality control and quality assurance procedures are well defined for use in pavement construction and rehabilitation. Areas needing further study are (a) documentation of pavement performance, especially the establishment of a framework and methodology for the systematic and continuous monitoring of pavement systems; (b) establishment of procedures for nondestructive testing and pavement evaluation; and (c) development of improved pavement design and rehabilitation procedures together with data for these procedures; including criteria for pavement unevenness for new surface construction, effects of frost on pavement performance, soil strength evaluation procedures.

Transportation Research Board Summ Rpt. FAA-RD-77-101, SR-175, May 1977, 13 pp

Contract W1-76-5258-1

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043179/1ST

03 166566
DEVELOPMENT OF A PAVEMENT MAINTENANCE MANAGEMENT SYSTEM. VOLUME II. AIRFIELD PAVEMENT DISTRESS IDENTIFICATION MANUAL
This manual is designed to provide airfield pavement inspectors with a comprehensive reference for pavement distress identification. The information is to be used in conjunction with procedures presented in Volume I of this report to determine pavement condition and maintenance and repair requirements. The types of airfield pavement distress are listed alphabetically under the major categories of asphalt-or tar-surfaced pavements and jointed concrete pavements. Names, descriptions, severity levels, photographs, and measurement or count criteria are presented for each distress type. (Author)
See also Volume 1, AD-A041 461.

Shahin, MY Darter, MI Kohn, SD
Army Construction Engineering Research Laboratory Final Rpt. CERL-TR-C-76-V2, AFCEC-TR-76-27-Vol-2, Nov. 1976, 114 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A042053/9ST

03 166578
POROUS FRICTION SURFACE RUNWAY AT USNAS DALLAS, TEXAS

The performance of the porous friction surfacing (PFS) on a runway at the U.S. Naval Air Station, Dallas, Texas, was evaluated. Runway friction measurements with a mu-meter, field permeability measurements, visual condition surveys, corings of the pavement for determination of asphalt binder properties, and an investigation of aircraft accidents attributed to hydroplaning were accomplished. The results of these investigations show that the porous friction surface is providing (1) a highly skid-resistant surface for high-speed jet aircraft operations; (2) an excellent surface with few visible defects; and (3) a minimum service life of 5 years with a potentially much longer life. (Author)

Brownie, RB
Naval Construction Battalion Center Final Rpt. CEL-TN-1487, June 1977, 31 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A042181/8ST

03 166633
AIRFIELD PAVEMENT EVALUATION. VOLUME 4. JULY 1975-JULY 1977 (A BIBLIOGRAPHY WITH ABSTRACTS)

The bibliography contains abstracts of Government-sponsored research reports relative to airfield pavement structures. Durability, wear resistance, skid resistance, and surface qualities are analyzed and evaluated. (This updated bibliography contains 169 abstracts, 35 of which are new entries to the previous edition.) See also NTIS/PS-76/0578, Airfield Pavement Evaluation. Vol. 1. 1964-1970, NTIS/PS-76/0579, Airfield Pavement Evaluation. Vol. 2. 1971-1972, and NTIS/PS-76/0580, Airfield Pavement Evaluation. Vol. 3. 1973-June, 1975.

Supersedes NTIS/PS-76/0581.

Habercom, GE, Jr
National Technical Information Service Aug. 1977, 174 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0662/5ST

03 166645
AIRPORT NOISE (A BIBLIOGRAPHY WITH ABSTRACTS)

Aircraft created noise, noise intensity, noise exposure, and physiological effects, all in airport environments, are investigated in these research reports. (This updated bibliography contains 219 abstracts, 47 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0625, and NTIS/PS-75/530.

Habercom, GE, Jr
National Technical Information Service Bibliog. Aug. 1977, 224 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0704/5ST

03 166716
LOGAN INTERNATIONAL AIRPORT MASTER PLAN

The Logan airport master plan is adopted by the Massachusetts Port Authority as its official policy statement regarding the future development and management of Logan International Airport. The plan addresses six major policy areas: growth, noise, land use, ground access, planning process and affirmative action. Background statements and brief descriptions of the implementation of these policies are included to provide a brief summary of the context of these policies.

Massachusetts Port Authority Apr. 1976, 83 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-268931/3ST

03 167186
TIRE HYDROPLANING (A BIBLIOGRAPHY WITH ABSTRACTS)

Studies are cited on the interaction of an automotive or aircraft tire with a wet pavement, resulting in reduced traction, skidding, or complete loss of contact under certain conditions. The discussions cover the composition and surface characteristics of highway and runway pavements, the acquisition or retention of water films on roads during rainfall, skid resistance and antiskid measures, tread engineering, testing and measuring equipment and methodology, critical speeds, wheel spindown, water depth factors, rolling contact loads, and associated topics. (This updated bibliography contains 103 abstracts, 20 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0684.

Adams, GH
National Technical Information Service Sept. 1977, 108 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0732/6ST

03 167196
PRELIMINARY TEST RESULTS OF THE JOINT FAA-USAF-NASA RUNWAY RESEARCH PROGRAM. PART 1: TRACTION MEASUREMENTS OF SEVERAL RUNWAYS UNDER WET AND DRY CONDITIONS WITH A BOEING 727, A DIAGONAL-BRAKED VEHICLE, AND A MU-METER

The stopping distance, brake application velocity, and time of brake application were measured for two modern jet transports, along with the NASA diagonal-braked vehicle and the British Mu-Meter on several runways, which when wetted, cover the range of slipperiness likely to be encountered in the United States. Tests were designed to determine if correlation between the aircraft and friction measuring vehicles exists. The test procedure, data reduction techniques, and preliminary test results obtained with the Boeing 727, the Douglas DC-9, and the ground vehicles are given. Time histories of the aircraft test run parameters are included.

Subm-Sponsored in Part by FAA and USAF.

Horne, WB Yager, TJ Sleeper, RK Merritt, LR
Langley Research Center NASA-TM-X-73909, May 1977, 123 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27132/8ST

03 167197
PRELIMINARY TEST RESULTS OF THE JOINT FAA-USAF-NASA RUNWAY RESEARCH PROGRAM. PART 2: TRACTION MEASUREMENTS OF SEVERAL RUNWAYS UNDER WET, SNOW COVERED, AND DRY CONDITIONS WITH A DOUGLAS DC-9, A DIAGONAL-BRAKED VEHICLE, AND A MU-METER

No Abstract.

Subm-Sponsored in Part by FAA and USAF.

Horne, WB Yager, TJ Sleeper, RK Smith, EG Merritt, LR
Langley Research Center NASA-TM-X-73910, May 1977, 341 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27133/6ST

03 167198
NASA DIAGONAL-BRAKED TEST VEHICLE EVALUATION OF TRACTION CHARACTERISTICS OF GROOVED AND UNGROOVED RUNWAY SURFACES AT MIAMI INTERNATIONAL AIRPORT, MIAMI, FLORIDA, 8-9 MAY 1973

Two runways were evaluated under artificially wetted conditions with the NASA diagonal-braked vehicle (DBV). Results of the evaluation which included a pavement drainage analysis, a pavement skid resistance analysis, and a DBV wet/dry stopping distance ratio analysis indicated that the ungrooved runway surfaces had poor water drainage characteristics and poor skid resistance under wet conditions at high speeds especially in rubbercoated areas of the runways. Grooving runways to a transverse 1-1/4 x 1/4 x 1/4 inch pattern greatly improved both the water drainage and pavement skid resistance capability of these asphaltic concrete surfaces.

Horne, WB
Langley Research Center NASA-TM-X-73912, May 1977, 53 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27134/4ST

03 167199
PLASTIC (WIRE-COMBED) GROOVING OF A SLIP-FORMED CONCRETE RUNWAY OVERLAY AT PATRICK HENRY AIRPORT: AN INITIAL EVALUATION
A wire-comb technique is described for transversely grooving the surface of a freshly laid (plastic state) slip-formed concrete overlay installed at Patrick Henry Airport. This method of surface texturing yields better water drainage and pavement skid resistance than that obtained with an older conventional burlap drag concrete surface treatment installed on an adjacent portion of the runway.

Marlin, EC Horne, WB
Langley Research Center NASA-TM-X-73913, May 1977, 32 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27135/1ST

03 167832
ENGINEERING BEHAVIOR OF PAVEMENT MATERIALS: STATE OF THE ART
This report reviews the engineering behavior of pavement materials with respect to highway and aircraft loadings and environmental conditions. The materials covered are bituminous mixtures, portland cement concrete, granular materials, chemically stabilized soils, and fine-grained soils. Basic properties of each are discussed. For bituminous mixtures, emphasis is placed on the characteristics of permanent deformation, fatigue, and rheological properties and the application to pavement design of accumulative damage theory based on Miner's hypothesis. Discussions are presented on the development of fatigue criteria from laboratory fatigue tests and design curves. For portland cement concrete, concrete strengths determined by various tests are discussed. Test procedures for determining the modulus of elasticity and Poisson's ratio are presented, together with discussion of factors affecting these values. The fatigue property of concrete and its relationship to pavement design are discussed. For granular materials, the resilient and plastic properties are discussed. Constitutive stress-strain relations proposed by many agencies are presented and compared. The relations consist of resilient, plastic, shear, and dynamic stresses and strains. Because of the highly nonlinear nature of granular materials, the validity of the superposition principle is applied to pavement design is discussed. For soil stabilization, the mechanisms of stabilization are explained, which included soil-cement, soil-lime, lime-fly ash, and lime-cement-fly ash and bituminous materials. Factors influencing engineering properties and properties of stabilized soils with respect to strength, modulus, and fatigue are discussed. For fine-grained subgrade soils, discussions also concentrate on the resilient and plastic properties. Constitutive stress-strain relations are presented with respect to resilient, static, viscoelastic, plastic, dynamic, and shear properties. The modulus of subgrade reaction used in rigid pavements and the nature of expansive soils in relation to rigid pavement design are discussed. /Author/

Chou, YT
Waterways Experiment Station, Council of Planning Librarians, (TR S-77-9) Final Rpt. FAA-RD-77-37, Feb. 1977, 409 pp, Figs., Tabs., Refs.

Contract DOT-FA73WAI-377

ORDER FROM: NTIS

AD-A045272/2ST

03 167971
CONCRETE IN TRANSPORTATION CONSTRUCTION (1891-1976)
The history of concrete pavement for highways and airfields is presented. Examples are given of pioneer projects, and developments in design and construction procedures since 1891 are traced. In addition to pavement, the paper covers the use of concrete in other highway appurtenances including shoulders, resurfacing, concrete Safety Shape barrier, and noise barriers. Recent uses of concrete in railroad and transit structures and the use of concrete in modern people mover systems are also covered.

Ray, GK (Portland Cement Association) *ASCE Journal of Transportation Engineering* Vol. 103 No. 5, Sept. 1977, pp 591-604, 19 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 168394
UNIQUE CONCEPTS AND SYSTEMS FOR "ZERO-MAINTENANCE" PAVEMENTS
This document is a State-of-the-Art report surveying many new, as well as infrequently used techniques for improving the performance of the components of pavement systems. The goal of this work was to identify important factors affecting the design of new structural systems for "zero-maintenance" pavements. The three basic components of the conventional pavement system--the subgrade, the subbase and base, and the surface course--have been examined. The latest techniques of strengthening and stabilizing the subgrade component, and preserving its improved properties are reviewed. The feasibility of utilizing synthetic aggregates and waste products in "zero-maintenance" pavements is addressed. The utilization of new materials and new systems such as prefabricated panels and pile supported pavements have also been investigated. Evaluations of existing information on the individual pavement system components have been synthesized to produce one modified conventional, and seven new structural pavement systems that may be capable of satisfying "zero-maintenance" criteria. /Author/

Saxena, SK Wang, JWH Udwair, JJ Rosenkranz, WJ
Dames and Moore Intrm Rpt. FHWA-RD-77- 76, July 1977, 266 pp, 109 Fig., 24 Tab., 8 Ref., 2 App.

Contract DOT-FH-11-9114

ORDER FROM: NTIS

PB-273110

03 168399
METHODOLOGY FOR DETERMINING, ISOLATING, AND CORRECTING RUNWAY ROUGHNESS
A method to determine the roughness of runway profiles in terms of aircraft response is presented. The aircraft response is specified in terms of pilot-station vertical accelerations, which are determined from computer simulation. Corrections to the profiles are then made to reduce the aircraft response.

This report was sponsored by the U.S. Department of Transportation, Federal Aviation Administration.

Seeman, DR Nielsen, JP
New Mexico University, Albuquerque, (CERF AP-24) Final Rpt. FAA-RD-75-110-II, June 1977, 33 pp, 18 Fig., 2 Tab.

Contract F29601-76-C-0015

ACKNOWLEDGMENT: Federal Aviation Administration, NTIS
ORDER FROM: NTIS

AD-A044328/3ST

03 168408
NONCONTACT NONDESTRUCTIVE DETERMINATION OF PAVEMENT DEFLECTION UNDER MOVING LOADS
This report presents a procedure for nondestructively evaluating and predicting the deflection response of various flexible pavements to loads imposed by different aircraft. Transfer function theory is used to form the basis of a pavement evaluation and response scheme. Two mobile systems were developed for the measurement of pavement deflections; the Light Emitting Diode (LED) system and the Linear Variable Differential Transformer (LVDT) system. The report concludes that the rapid nondestructive measurement of pavement deflections due to moving prototype loads is feasible and that a total nondestructive evaluation scheme based entirely on the use of prototype loads and measured deflections can be fabricated to evaluate and predict instantaneous response and cumulative effects of loads of various magnitudes and configurations. /Author/

Harr, ME Ng-A-Qui, NT
Purdue Research Foundation Final Rpt. FAA-RD-77-127, Aug. 1977, 312 pp, Figs., 71 Ref., 5 App.

Contract DOT-FA73WAI-361

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: NTIS

AD-A047161

03 169044
INTERACTIONS OF TECHNOLOGY AND SOCIETY: IMPACTS OF IMPROVED AIR TRANSPORT. A STUDY OF AIRPORTS AT THE GRASS ROOTS
The feasibility of applying a particular conception of technology and social change to specific examples of technological development was investigated.

The social and economic effects of improved airport capabilities on rural communities were examined. Factors which led to the successful implementation of a plan to construct sixty small airports in Ohio are explored and implications derived for forming public policies, evaluating air transportation development, and assessing technology.

Laporte, T Rosenthal, S Ross, S Lee, KN Levine, E
California University, Berkeley NASA-CR-2871, July 1977, 296 pp

Contract NGR-05-003-471

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-31005/0ST

03 169193
MONITORING THE EFFECTS OF THE DALLAS/FORT WORTH REGIONAL AIRPORT. VOLUME I. GROUND TRANSPORTATION IMPACTS

The report presents new conceptual and methodological approaches to developing models to interrelate airline schedules, airport-based employee work-shift schedules, and airport access ground traffic volumes in any time period for a given report. The results of a survey of ground travel at the Dallas/Fort Worth Regional Airport are presented and analyzed. Specific ground transportation impacts of the installation of this relatively new airport are assessed. Models are described which (1) express volumes of automobiles carrying airline passengers and visitors as a function of airline schedules and (2) transform existing or future employee work-shift schedules into estimates of incoming and outgoing employee vehicle volumes in any time interval. Preliminary research toward the development of a model to estimate public transit passenger volumes as a function of airline passenger volumes is also described.

Dunlay, WJ, Jr Henry, L Caffery, TG Wiersig, DW Zambrano, WA
Texas University, Austin, Department of Transportation Res. Rpt. DOT-RSPD-DPB-50-7703, RR-36, Dec. 1976, 203 pp

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274117/1ST

03 169218
CONCEPTS FOR ESTIMATING CAPACITY OF BASIC RUNWAY CONFIGURATIONS

One method of evaluating the impact of changes in the governing longitudinal separation standards on final approach is through the estimation of runway capacity. This paper presents concepts for such an estimation. The arrival stream is analyzed with respect to the applicable longitudinal separation standards. ATC system performance and the interactions with departures, if any, is governed by the appropriate ATC rules and procedures. Concepts are developed for arrival only, departure only, arrival/departure, dual-lane, and intersecting runway configurations. The revision updates the January 1976 version, primarily with respect to the detail of dealing with intersecting runway configurations.

Amodeo, FA Haines, AL Sinha, AN
Mitre Corporation, Federal Aviation Administration Tech Rpt. MTR-7115-Rev-1, Mar. 1977, 50 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274578/4ST

03 169442
ESTABLISHMENT OF NEW MAJOR PUBLIC AIRPORTS IN THE UNITED STATES

This study was performed in response to Section 26(2) of the Airport and Airway Development Act Amendments of 1976 (Public Law 94-353) which directed the Secretary of Transportation to conduct a study on the establishment of new major public airports in the United States, including (a) identifying potential locations, (b) evaluating such locations, and (c) investigating alternative methods of financing the land acquisition and development costs necessary for such establishments. The report assesses needs for major new airports in the United States through the year 2000. Potential airport locations, the general size requirements of new airports, financing, and airport development issues and problems are also analyzed under a variety of future conditions. The potential need for new major airports is highly sensitive to the future forecasted activity, extent of accommodation of general aviation, effectiveness of the upgraded third generation air traffic control system in increasing capacity, and peak spreading, in that order. (Author)

Federal Aviation Administration FAA-ASP-77-3, Aug. 1977, 140 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046462/8ST

03 169444
AIRPORT LAND BANKING STUDY REPORT 1977-2000

This study was performed in response to Section 26(1) of the Airport and Airway Development Act Amendments of 1976 (Public Law 94-353) which directed the Secretary of Transportation to conduct a study with respect to the feasibility, practicability, and cost of land bank planning and development for future and existing airports to be carried out through Federal, State, or local government action and report the results to Congress by July 12, 1977. Airport land banking was studied and analyzed from several different perspectives, including legal, economic, and financial, and the results of this study are reported in this document. (Author)

Federal Aviation Administration FAA-ASP-77-7, Aug. 1977, 73 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046475/0ST

03 169643
MUNICIPAL AUTHORITIES IN PENNSYLVANIA

The 2,500 municipal authorities form a significant part of Pennsylvania's local government system. This publication describes the organization and operation of a municipal authority and outlines its powers. The book also contains the complete current text of the Municipality Authorities Act of 1945, the enabling legislation under which authorities are created. Municipal authorities have provided the means for financing many needed capital investments in community projects. In some cases the authority is merely a financing mechanism and leases back the project to the school district or municipality for operation. In other instances the authority directly operates the project, much like a local public utility. Reform of the constitutional limits on municipal debt in 1968 removed the necessity for municipalities to finance large projects through authorities. However, there are other considerations which cause municipalities to create authorities when planning new projects. However, there are drawbacks to creation of another government entity and municipal officials must weigh the pros and cons before making such a decision. This publication will assist them by providing basic information on authorities.

Schlosser, DG Hoffman, C Baur, AA Hydeman, ALJ Coleman, GL
Pennsylvania Department of Community Affairs May 1977, 68 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-273456/4ST

03 169645
WESTOVER INDUSTRIAL AIR PARK

The Westover Metropolitan Development Corporation's (WMDC) purpose is to aid private enterprise in the orderly conversion and redevelopment of 1,340 acres of surplus property declared surplus by the federal government at Westover Air Force Base, Massachusetts. Since its inception, the WMDC has dealt with the problems of acquiring title from the federal government for the surplus property under its purview and planning a logically derived conception of development of a complex facility. A major accomplishment during the past year was finalizing the acquisition of 873 acres of surplus property in the Town of Ludlow and concluding the Lease-Purchase Agreement with the Massachusetts Municipal Wholesale Electric Company.
See also report dated Apr 76, PB-258 141.

Westover Metropolitan Development Corporation, Economic Development Administration Stat Rpt. EDA-77-0147, July 1977, 48 pp

Grant EDA-01-6-01228-27

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-273466/3ST

03 169687
ROSEBURG AIRPORT INDUSTRIAL PARK FEASIBILITY ANALYSIS, OREGON
The purpose of the study is to analyze and evaluate certain parcels of Roseburg airport acreage for its potential commercial or industrial development. The outcome of this analysis will include a recommended general plan and economic evaluation of carrying out this plan. The objectives of this feasibility study will be to critically and objectively evaluate the economic, physical and financial merits of developing a light industrial/commercial park at the Roseburg airport; Analyze the physical characteristics of the subject site; Evaluate market demand for land use and identify the potential of maximizing return and absorption; Provide a development plan for the subject properties and establish planning and management guidelines leading to eventual implementation of the proposed program.

Prepared by DMJM Hilton, Roseburg, Oreg. and Jarvis (Jack) and Co., Inc., Roseburg, Oreg.

Hilton (DMJM), Jarvis (Jack) and Company, Incorporated, Economic Development Administration EDA-77-0157, Nov. 1977, 96 pp

Grant EDA-07-6-01677

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274004/1ST

03 170081
AN INTER-CITY TERMINAL ACCESS MODAL CHOICE MODEL
The calibration and testing of a modal split model for access to and egress from airports and centrally located rail terminal was undertaken as part of a detailed analysis of bimodal choice between rail and air for inter-city travel in Great Britain.

Leake, GR Underwood, JR *Transportation Planning and Technology* Vol. 4 No. 1, 1977, pp 11-21, 5 Phot., 13 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: ESL

03 170248
PAVEMENT MANAGEMENT DESIGN CONSIDERATIONS
A synopsis is given of Transport Canada structural design practices for the provision of airfield asphalt pavements at Canadian airports. Pavement management design considerations in the related areas of construction, evaluation, operations, maintenance and rehabilitation programming are also discussed in a general manner. A short summary of Transport Canada research and development objectives as related to asphalt pavement structural design are outlined. A detailed treatment of standards and practices may be found in the Transport Canada manuals listed in the references. /Author/

Volume I of proceedings of 4th International Conference on Structural Design of Asphalt Pavements, Ann Arbor, Michigan, August 22-26, 1977.

Argue, GH Denyes, BB Sebastyan, GY (Airside Surface Structures, Canada)
Michigan University, Ann Arbor Proceeding Jan. 1977, pp 786-793, 10 Fig., 8 Tab., 11 Ref.

03 170358
ICE FORMATION IN FRICTION COURSE SURFACES
The paper discusses problems experienced by the RAF in the chemical anti-icing and de-icing of bituminous friction course runways. Possible applications to normal highway de-icing are mentioned. Although for highway application salt/sand mixtures are used, only non-corrosive substances are acceptable for airfield runway use. Results of tests to evaluate the efficiency of de-icing and anti-icing chemicals such as konsin and frigantin are mentioned. Details are given of anti-icing precautions taken during cold weather conditions to maintain runways in an operational state by the application of low freezing point chemicals. /TRRL/

Ministry of Defence, England Monograph Apr. 1977, 8 pp, 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 225917)

03 170835
SYSTEM ANALYSIS IN AIRPORT MASTER PLANNING
The traditional approach to airport master planning, that process which tries to provide the best plan for the development of airport facilities, is first outlined. Origins of pressures for changing these procedures are then identified. New systems analysis techniques developed in order to improve evaluation of alternative planning solutions, and to quantify various consequences of adopting these alternatives are described.

Young, C Nemec, J *ASCE Journal of Transportation Engineering* Vol. 100 No. TE4, Nov. 1974, pp 933-941, Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: ESL

03 170853
LOCATION OF AIRPORTS IN DENMARK
The 10 domestic air routes in Denmark are investigated. The traffic volumes, the fares, the number of departures and the travel times are given. The airport hinterlands are analysed. The average hinterland is only 4,000 km2, the air traffic carries 10-40 pc of all intercity passengers, mainly business trips. A traffic forecast is given for the number of passengers by air, when a large bridge-tunnel has been built. Theoretical location models are given to find out the ideal number of airports and locations. The network is a tree (star) with Copenhagen as center. Large aircraft and remote airfields should not be used. Distance between airports should be more than 80 km. Each airport should have a volume of more than 10,000 passengers-year.

Rallis, T
Royal Technical University of Denmark July 1975, n.p.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

03 170858
LOCATION OF CAPITAL AIRPORTS
Description of the structure and future development of the airspace and air traffic control system, especially safety of aircraft operations. Mathematical models are presented for the calculation of collision risks. Environmental and access criteria to locate aerodromes on the ground are then treated. Public transport taking over a part of the traffic to and from the airports has been analysed. An evaluation of the possibilities to extend and relieve existing airports by existing airfields or to construct new aerodromes is finally given. Also transfer of air passengers to other means of transport has been studied.

Denver, L
Royal Technical University of Denmark 1974, n.p.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

03 170864
SOUTH EAST AIRPORTS
This report is a response to the consultation document published in November 1975 by the Board of Trade, "Airport Strategy for Great Britain, part 1: The London Area". It concentrates upon the regional planning implications of the possibilities for the future development of the airports in the south east. It accepts that the throughput of passengers and cargo will increase but does not accept that existing airports should be extended. Alternatives should be sought within and outside the region.

Standing Conf on London and SE Regional Planning 1976, n.p., Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Standing Conf on London and SE Regional Planning, 26 Old Queen Street, London SW1H 9HP, England

03 172164
FREEZE-THAW TESTS OF LIQUID DEICING CHEMICALS ON SELECTED PAVEMENT MATERIALS
Tests were conducted to assess the extent of surface degradation resulting from the application of non-chloride deicing chemicals on three types of airfield pavments. The chemicals tested were proprietary mixtures of urea, formamide, and ethylene glycol; sodium chloride, distilled water, and dry specimens were used as controls and for comparison. Pavements included new and old specimens of open-graded asphaltic concrete and old specimens of dense-graded asphaltic concrete. Portland cement concrete specimens used were new and old, with the without air-entrainment. New and old tar rubber concrete specimens were also tested. Samples were subjected to up to 60 freeze-thaw cycles with deicing chemicals flooding their upper surface. Each specimen was rated on a scale of 0-5 after every five freeze-thaw cycles. All PCC specimens showed some surface degradation, whereas the dense-and open-graded asphaltic concretes were largely unaffected. /Author/

Funding for this research was provided by U.S. Air Force Civil Engineering Center.

Minsk, LD
Cold Regions Research and Engineering Laboratory, (AFCEC-Proj.-1E2-72-1) CRREL Rpt. 77-28, Nov. 1977, 16 pp, 5 Fig., 4 Tab., 7 Ref., 2 App.

ACKNOWLEDGMENT: Cold Regions Research and Engineering Laboratory

03 172440
ANALYSIS OF PERMANENT DEFORMATIONS OF FLEXIBLE AIRPORT PAVEMENTS
This study was conducted to investigate the deformation characteristics of component materials in a flexible pavement system subject to moving aircraft loadings, and to attempt to develop a prediction model to estimate permanent deformation. A literature survey was first conducted on the deformation characteristics of pavement component materials and the computational techniques to predict the amount of deformation. Series of laboratory repeated load tests measuring permanent strain were performed on subgrade soil and untreated granular materials. The results were used as input to a layered elastic computer program to determine the accumulated permanent deformation that occurred in each layer of the pavement. It was concluded that it is not possible to predict the permanent deformation that occurs in a pavement using the layered elastic computer program; thus, it was recommended that efforts be made to study the basic deformation characteristics of asphaltic concrete and untreated granular soils in a pavement system and later initiate a development program for prediction models when the information becomes available. The permanent deformation occurring in the subgrade soil of many pavements was computed using the linear layered elastic computer program and laboratory repeated load test data. Results of the analysis indicate that the current concept of the control of subgrade rutting in flexible pavements by the limitation of elastic strain is not strictly correct. When subgrade strain is limited subgrade rutting may not be limited and may not be controlled.

This report was also published as Federal Aviation Administration Report-FAA-RD-77-6.

Chou, YT
Waterways Experiment Station Final Rpt. Tech. Rpt. S-77-8, Feb. 1977, 116 pp, 30 Fig., 11 Tab., 56 Ref.

Contract DOT FA73WAI-377

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: NTIS

AD-A044269/9ST

03 172450
SNOW REMOVAL: 1978
This article describes the snow covered operations of five major airports: Houghton County Memorial/Hancock, Burlington International Airport, Buffalo International Airport, Indianapolis International Airport, and Eppley Field/Omaha. It was generally concluded that to effectively remove snow and keep runways open, the snow must be removed as it falls, urea must be applied immediately (temperature permitting, 25 degrees F or above) and banks should be groomed to prevent drifing. Proper ground communications was emphasized to reduce the possibility of incidents between snow removal equipment and aircraft or ground vehicles. Lastly, proper winter dress may save the crew frostbite or sweltering in the truck. Sno-mobile suits are becoming increasingly popular because they afford a new member the choice of storing the suit while driving a heated vehicle, or wearing it outside while clearing the snow.

Airport Services Management Vol. 18 No. 2, Feb. 1978, pp 15-17

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, Incorporated, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 172451
THE PLACE FOR CAR RENTALS
The author examines the rapid growth in airline passenger traffic and airport-based rental fleets. The economic consequences of this growth to car rental organizations and airport authorities, and the problems faced by airport-based car rental concessionaires are discussed. The author states that consultation between airport management and concessionaires regarding further plans and improvements is critically important. Most major rental organizations are concerned with present-day constraints in providing sophisticated and efficient services to business and holiday travellers. They are especially concerned in determining the level of additional facilities and services required to meet the projected volume of travel. Two problem areas are reviewed. The need for adequate rental counter facilities in the terminal baggage area discusses problems for counter space, the need for clear directional signs to rental counters, and standardized methods of signage. Secondly, the problem of providing parking spaces near the terminal for customer-ready cars discusses walking distances, terminal parking facilities, back-up service facilities and clear directional signs.

Genovese, V (Avis Rent a Car) *Airports International* No. 64, Dec. 1977, pp 11-14

ACKNOWLEDGMENT: Airports International
ORDER FROM: IPC Transport Press

03 172458
AIRFIELD PAVEMENTS ON VERY SOFT GROUND [Pavimentazioni aeroportuali in terreno molto compressibili]
The terrain in question consists of a stratified peaty clay extending to a great depth. The solution proposed is a three-layer construction slightly proud of ground level (to facilitate water run-off), using materials of adequate strength but of low specific weight. The subgrade is constructed by stabilising the natural terrain with lime or cement. This is surmounted by a slab of reinforced lightweight concrete followed by a film of bituminous or resin binder, on to which the top layer of normal or light bituminous mix is laid. A mathematical model is presented for the derivation of design thicknesses. [Italian]

Priolo, D *Rivista della Strada* Analytic Vol. 46 No. 435, Oct. 1977, pp 937-942, 4 Fig., 6 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-230368)

03 172461
THE LOAD BEARING CAPACITY AND DESIGN OF AIRPORT RUNWAYS [Tragfaehigkeit und Bemessung von Flugplatzdecken]
The load bearing capacity of airport runways is evaluated internationally by means of a load classification number (LCN). This make it possible, on the basis of a design process based on the elastic theory, to dimension runways for various types of aircraft for a given number of loadings. The LCN method which was first published by the British Air Ministry in 1951, has been altered repeatedly. Recently, because of the large number of parameters which are difficult to determine by means of a sub-division of the LCN into groups LCG I-III corresponding to LCN 120 these have been simplified to less than 10. The calculation of the equivalent individual wheel load is given. For concrete pavements, the LCN value is determined experimentally by means of load plate tests, for asphalt pavements the deflection under a rolling load is measured. In the design of aircraft runways a differentiation is made between "critical areas" (parking areas, runways proper) and "non-critical areas", and in accordance with English proposals also between channelled and non-channelled traffic. The method of design is explained for jointless and continuously reinforced concrete pavements as well as asphalt pavements. For the repair of existing pavement, 16-18 cms thick, bituminous surfacing is employed or continuous concrete surfacing 20-22 cms thick. /TRRL/ [German]

Eisenmann, J *Strasse und Autobahn* Analytic Vol. 27 No. 7, July 1976, pp 265-273, 14 Fig., 4 Tab., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-305122)

03 172462
THE USE OF SLIP FORM PAVERS IN THE CONSTRUCTION OF A CONCRETE RUNWAY AT THE ZURICH-KLOTEN AIRPORT [Gleitschalungsfertiger-Einsatz beim bau einer Betonpiste, Flughafen Zuerich-Kloten]
The Federal Republic of Germany uses slip form pavers for all cases of carriageway construction involving working widths of up to 3.25 M. This is due to the large investments necessitated by both the pavers themselves and the mixing plants, despite their other technical advantages. This paper describes the construction of a 3.3 km long concrete runway laid in 8/7.5 M wide strips. Deviations from west German specifications and other factors are investigated, e.g. The use of rounded gravel in place of chippings, the type, spacing and installation of joints, the omission of dowels. Depending on the subsoil, the subgrade and roadbase are laid in 2 or 3 layers with 55 cm, 65 cm or 75 cm thicknesses. The 30 cm thick concrete runway in the middle working strip (30 M) is reduced to 20 cm towards the edge. With an output of approximately 90 cubic M per hour per mixer and a speed of approximately 1.5 m/min, daily outputs of 650 to 750 M are achieved. In

all, about 55000 cubic M of concrete were laid (300 kg cement/cubic M concrete, 0.5% concrete plasticizers, and 0.42% of cement weight of air entraining agents). [German]

Weber, R *Beton* Analytic Vol. 25 No. 11, Nov. 1975, pp 377-381, 10 Fig., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-205072)

03 172520
CONSTRUCTION OF NEW INTERNATIONAL AIRPORT, BRUNEI

This paper deals with the particular problems of earthworks and pavement construction at a new international airport in Brunei. The airport was designed and constructed between 1966 and 1972 on a site some 8 km nw of the town of Bandar Seri Begawan. The 285 ha site, much of which had almost impenetrable jungle cover, comprised both high hills and peat swamps necessitating extensive cut and fill operations and a total earthworks volume amounting to some 6.5 million M3. Earthmoving was carried out with a fleet of scrapers and ancillary equipment, while swamps under pavements were excavated by draglines loading into trucks. Excavations were backfilled with material of low compressibility, and controlled settlement was carried out using earth surcharge to calculated heights. The work was carried out under conditions of heavy rainfall and high humidity. The paper describes in some detail methods used for the monitoring of settlements. Some anomalous results are discussed. The runway, 3650 M long, has a flexible pavement consisting of beach sand, cement-stabilized to part of its depth, cement-bound gravel and Marshall asphalt surfacing. The runway ends, taxi-ways and apron are of reinforced concrete. The flight strip has a width of 304 M. Methods used for winning stone from jungle areas remote from the site and the transportation by river are described, as are the logistical problems encountered by the contractor in the importation of heavy equipment. Construction procedures are described in detail and brief mention is made of the terminal buildings complex and of the radio-navigational aids provided.(a) /TRRL/

Sterling, WAD Paget, CB (Scott, Wilson and Kirkpatrick) Eddison, JM (Asian Development Bank) Earwaker, MC (Scott, Wilson and Kirkpatrick) *Institution of Civil Engineers, Proceedings* Vol. 62 Nov. 1977, pp 605-622, 7 Fig., 2 Tab., 3 Phot., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-229931)
ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

03 172709
WAKE TURBULENCE DETECTION AND ECONOMIC IMPACT OF PROPOSED IMPROVEMENTS

Increased separations of aircraft following heavy jets, which have been mandated because of the threat posed by aircraft trailing wake vortices, have aggravated the problem of air traffic delays at some of the busier airports. An extensive vortex measurement program at three major airports has provided the data base for the design of a Vortex Advisory System which will permit reduction of the vortex imposed separations under certain measurable wind conditions. This system which promises to effect an appreciable reduction in traffic delay is currently undergoing testing at Chicago's O'Hare International Airport.

Prepared for SAE Meeting, May 10-12, 1977.

Wood, WD (Transportation Systems Center) McWilliams, IG
Society of Automotive Engineers Preprint SAE 770583, 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 172710
AIRPORT PLANNING AND ECONOMICS: SOME CHANGING PERSPECTIVES

The airport planning business has undergone a substantial perspective evolution in the past ten years. A basic economic need for high-speed, long-haul transportation resulted in the introduction of commercial turbojet aircraft in the late fifties. A nationwide airport capacity crisis seemed imminent as forecasts in the mid to late sixties projected strong growth rates. Many airport planners felt that the inability to meet the need for airport capacity would be disastrous. This anticipated crisis, however, never fully materialized. Factors, mostly economic, have permitted the imposition of limited non-construction alternatives such as quotas to alleviate the congestion problem. In addition other economic and technical matters such as the application of demand forecasts and the assessment of capacity, reliance on potential technology and automation, and the selection of airport concepts have significantly altered the planning process.

Prepared for SAE Meeting, May 10-12, 1977.

Goodwin, JR (Federal Aviation Administration)
Society of Automotive Engineers Preprint SAE 770581, 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 172732
LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; NUMERICAL MODEL FEASIBILITY STUDY

An integral part of the feasibility assessment of a proposed offshore jetport site near Cleveland, Ohio, is the investigation of the hydrodynamics of Lake Erie to aid in determining the effects of the structure on such phenomena as seiching, storm surge, and lake circulation. To assist in determining these effects, the feasibility of using numerical modeling techniques was investigated. Numerical models that appeared capable of predicting the extent and magnitude of hydrodynamic changes produced by the proposed jetport were reviewed. Based upon this investigation, a determination was made of the feasibility of applying numerical models to the problems of seiching, storm surge, and lake circulation in Lake Erie.

Raney, DC Durham, DL Butler, HL
Waterways Experiment Station Tech Rpt. H-74-6, Apr. 1977, 151 pp, 35 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 172807
SOUND-PROOFING FOR BUILDING NEAR AIRPORTS

The article evaluates the methods applied to sound insulation of buildings that are located at the airport or very close to it. Using the Sheraton Hotel at Frankfort, Federal German Republic, it is outlined how noise levels may be kept low inside, in spite of high environmental noise.

Schwartz, KG *Airport Forum* Vol. 7 No. 2, Apr. 1977, p 53, 11 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 172873
DESIGN AND CONSTRUCTION OF CONTINUOUSLY REINFORCED CONCRETE AIRPORT PAVEMENTS

This report provides design procedures for continuously reinforced concrete (CRC) airport pavements. The basic physical-mathematical model and applicable analyses are discussed. Thickness design procedures for both new CRC pavements and CRC overlays are presented for both civil and military aircraft. Methods of designing steel reinforcement, construction joints, and terminal treatment systems are included. All of these procedures are recommended for immediate use. /Author/

This report was sponsored by the Office of Engineers, U.S. Army and the Federal Aviation Administration.

Harvey, GG
Waterways Experiment Station, (WES TR S-77-11) Final Rpt. FAA-RD-74-37, WES-TR-S-77-11, Aug. 1977, 92 pp, 36 Fig., 6 Tab., 27 Ref.

Contract DOT-FA81WAI-218

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: NTIS

AD-A049970

03 173474
RECYCLED SLAB IS NEW RUNWAY BASE

The paper reports that the project to strengthen and replace the keel section of a runway at the Jacksonville International Airport, Jacksonville, Florida, was under the spotlight as the specification called for crushing and reusing the existing 11-in. portland cement concrete pavement. Some of the concrete was mixed with new portland cement and reused as an econocrete base for the new portland cement concrete pavement, while the remainder served as a subbase drainage material for the econocrete.

Highway and Heavy Construction Vol. 120 No. 7, July 1977, pp 30-33

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 173476
AIRPORT CHOICE IN LOW DEMAND REGION
Air traveling by residents of the core area of St. Lawrence County, New York is characterized by long ground access distance and is subjected to influences by airports across the border in Canada. To provide a means for evaluating potential impacts of new or improved regional airports which are to serve the area, a study is conducted to model the choice of competing airports by the air passengers. The study is based on data collected from a telephone survey of 16.6% of the households. A binary choice model is found to be able to explain the choice behaviors adequately. The model does not have to rely on large data base. It is theoretically sound and easy to apply.

Lin, F (Clarkson College of Technology) *ASCE Journal of Transportation Engineering* Vol. 103 No. 6, Nov. 1977, pp 711-727, 11 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 173498
CURRENT METHODS FOR THE MAINTENANCE OF TRAFFICKED SURFACES IN WINTER (ROADS, RAILWAYS, CITIES, AIRPORTS) [Standa der Betreuungsmoeglichkeiten von Verkehrsflaechen im Winter (Strasse-Schiene, Staedte-Flughaefen)]
This is the publication of the proceedings of the international winter maintenance congress, 1975, which was held from 19th-21st February 1975. Problems of winter maintenance are reported for highways, railways, cities and airports. [German]

Strassenforschung Monograph No. 41, 1975, 204 pp, Figs., Tabs., Phots., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 304856), Federal Institute of Road Research, West Germany

03 173502
TRAFFIC MANAGEMENT POLICIES AT A MAJOR AIRPORT
This paper discusses existing traffic management policies in use at major airports, both overseas and in Australia. It describes the London airports' use of various elements of peak pricing, and the u.s. Approach of regulation and negotiation between users. Management procedures currently exist at several major Australian airports for international airlines and at Sydney for general aviation (to a limited extent). The two alternative approaches to management are then further developed. The airport authorities can impose a surcharge at peak periods, in the best traditions of classical economics, and hope that those flights with lower surplus values will automatically reschedule themselves to the less congested periods. Alternatively a maximum number of movements can be set by an outside body, and the airlines then decide themselves how these should be allocated between airlines. The likely effects at Sydney of adopting either of these two approaches are discussed and compared. (A). The number of the covering abstract is IRRD no. 227882.

Amos, PF (Travers Morgan Proprietary Limited) Bullock, RG (Commonwealth Bureau of Roads, Australia)
Victoria Ministry of Transport, Australia Analytic May 1977, 18 pp

ACKNOWLEDGMENT: TRRL (IRRD 227902)

03 173687
AIRPORT DEVELOPMENT IN SOUTH WALES AND THE SOUTH WEST REGION OF ENGLAND
This study covered an area which would be the origin or destination of over 9 million international air travellers by 1990, and included 16 counties and 8 local government districts. The forecasting of passengers (international and domestic) at airports, and the costs and benefits of each system are detailed. Having determined the demand for air services by route, place of origin, or destination in the study area, by type, market (charter or schedule), and by type of passenger (business or leisure/foreign or UK resident), an allocation procedure was applied to the forecasts to determine the airports that the air traveller will use. The basis of the traffic allocation procedure model is that, faced with a choice of airports to reach a chosen destination, the air traveller will tend to choose the cheapest airport alternative. The cost used in the passenger allocation model as well as other costs are discussed. Comments are made on the costs associated with airport closures. The results of the cost benefit analysis are presented, and the results are assessed. The study found that because of the proximity of the area to London and Birmingham, most of the potential passengers travel through airports outside the area. The largest airport forecast in the region by 1990 is one of 2.6 million passengers and no airport in the area will be profitable by 1990. Further study conclusions relating to environment, siting, and the best airport system are also presented.

Civil Aviation Authority, England CAP 377, Aug. 1975, 46 pp, Figs., Tabs.

ACKNOWLEDGMENT: Civil Aviation Authority, England
ORDER FROM: Civil Aviation Authority, England, Space House, 43/59 Kingsway, London WC2B 6TE, England

03 173689
FUTURE AIRPORT DEVELOPMENT IN SOUTH WALES AND THE SOUTH WEST OF ENGLAND
The following general conclusions were drawn from this study. The present airport system in South Wales and South-West Wales has become over-extended, in addition too many airports are competing for air transport service and attempting to offer too wide a range of air services. Continuing the present airline and airport policies would lead to a high-cost system of air services. The airport system has developed this way through the willingness of airlines, airports and the Civil Aviation Authority (CAA). The efforts of airport management are geared almost exclusively to maximizing the volume of passenger and freight traffic rather than raising more revenue per passenger handled and overall profitability on current and capital accounts. Where local airports can economically provide an air service it is clearly offering a premium standard of service and consequently airport charges per passenger carried will normally be expected to exceed those at larger international airports.

Civil Aviation Authority, England CAP 380, Jan. 1976, 13 pp, Tabs.

ACKNOWLEDGMENT: Civil Aviation Authority, England
ORDER FROM: Civil Aviation Authority, England, Space House, 43/59 Kingsway, London WC2B 6TE, England

03 173691
AIRFIELDS FOR GENERAL AVIATION IN SOUTH EAST ENGLAND
This report provides an assessment of how available powers and influence over the use of airfields in the region might be exercised over the coming years so that airfield usage and development can meet growth and change in aviation needs in a way that reasonably balances the interests of aviation and of local populations. In addition, this report examines operational, economic, noise and other environmental factors that are relevant to the consideration of future changes in airfield use. The report concludes by suggesting a strategy to guide future airfield development in the region, indicating how the scale and type of flying at airfields might change or be allowed or encouraged to change in the coming years in a way that reasonably balances the interests of aviation and of the local public.

Standing Conf on London and SE Regional Planning Mar. 1976, 45 pp, Tabs.

ACKNOWLEDGMENT: Standing Conf on London and SE Regional Planning
ORDER FROM: Standing Conf on London and SE Regional Planning, 26 Old Queen Street, London SW1H 9HP, England

03 173694
A LATERAL STEERING DYNAMICS MODEL FOR THE DALLAS/FORT WORTH AIRTRANS, RESEARCH REPORT
A lateral dynamic steering model of the automatically steered AIRTRANS vehicle at the Dallas/Fort Worth Airport is developed. The general nonlinear model is linearized and presented in a form suitable for ride quality investigation. A set of independent, non-dimensional vehicle parameters is identified. Basic system natural frequencies and modes are identified, and the sensitivity of system response to basic system design parameters is presented. It was found that vehicle steering gain and speed have a greater effect upon vehicle ride quality than other vehicle parametes. /Author/

Prepared in cooperation with the Department of Transportation, Office of University Research.

Smith, CC Tsao, S
Texas University, Austin Dec. 1976, 74 pp, Figs., Tabs., Apps.

Contract DOT-OS-50126

ORDER FROM: NTIS

03 173695
MONITORING THE EFFECTS OF THE DALLAS/FORTH WORTH REGIONAL AIRPORT ON LAND USE AND TRAVEL BEHAVIOR. EXECUTIVE SUMMARY OF RESEARCH REPORT 37

This report is in four parts. Each deals with some aspect of the impacts of the Dallas/Forth Worth Regional Airport on land use or travel behavior. At the same time, each part investigates the impacts of the airport as a case study of a more general and currently important problem. Thus, section one deals with showing how a common multivariate technique, factor analysis, can be used to isolate dimensions of land use change following a major transportation investment. Part two presents a model of political decision making in a region particularly affected by transportation change. Part three uses data from Dallas and Fort Worth to study the perception of time during travel; time perception of time from origin to destination influences whether a journey is made or not, and the route taken. Time condition is thus a major influence on traffic flows in cities; therefore, the general modeling and policy implications of time cognition are studied. Finally, travel behavior using existing and new land use facilities is examined. A technique (conjoint measurement) is used to identify how travelers perceive and use different destinations for a given trip purpose. Because this is a new application of the technique, the last part of the report focuses on problems of its application and their resolution. /Author/

Prepared in cooperation with the Department of Transportation, Office of University Research.

Burnett, P Chang, D Gregory, C Friedman, A Montemayor, J Prestwood, D
Texas University, Austin July 1976, 4 pp, Refs.

ORDER FROM: NTIS

03 173696
MONITORING THE EFFECTS OF THE DALLAS/FORTH WORTH REGIONAL AIRPORT VOLUME I: GROUND TRANSPORTATION IMPACTS. EXECUTIVE SUMMARY OF RESEARCH REPORT 36

Automobiles traffic patterns on airport access roadways depend largely on airline flight schedules and employee work-shift schedules. This report introduces and references mathematical models for estimating the volumes of automobile traffic entering and leaving an airport in any specified time period as a function of these schedules. The models can be used to obtain accurate estimates of traffic peaking characteristics. They can also be used to evaluate the effects of proposed changes in airline schedules or work hours on airport access congestion. Another application of the models is to transform demand forecasts, in the form of proposed airline schedules or estimates of future airport employment, into forecasts of the future airport access traffic demand due to air passengers and employees. The purpose of this summary is to describe briefly the basic concepts and the application of the models to their potential users. Formal derivations of the models and the probability theory behind them are detailed in the main body of this report. /Author/

Prepared in cooperation with the Department of Transportation, Office of University Research.

Dunlay, WJ, Jr Henry, L Caffery, TG Wiersig, DW Zambrano, WA
Texas University, Austin Dec. 1976, 3 pp, 3 Ref.

Contract DOT-OS-30093

ORDER FROM: NTIS

PB-274117/1ST

03 173698
GUIDEWAY SIDEWALL ROUGHNESS AND GUIDEWHEEL SPRING COMPRESSIONS OF THE DALLAS/FORT WORTH AIRTRANS. RESEARCH REPORT

The instrumentation of an AIRTRANS vehicle at the Dallas/Fort Worth Regional airport has been accomplished to study guideway sidewall roughness and guideway sidewall steering forces. Guidebar accelerations and guidewheel spring compressions were recorded and digitally processed to yield power spectra of guidewheel spring compressions and guideway sidewall roughness. From the spring compression data, it was learned that the forces transmitted to the guidewall through the front steering assembly of the vehicle can be at least one order of magnitude large in a sharp (150 ft. radius) curve of the guideway than in the more gentle (approximately 800 ft. radius) curves. An analytical expression for the guideway sidewall roughness was developed and it was found that AIRTRANS guideway sidewalls have more high wavelength roughness and less low wavelength roughness as compared to the vertical roughness of typical highways. The magnitude of the sidewall roughness was found to be comparable to the roughness of interstate quality highways. /Author/

Prepared in cooperation with the Department of Transportation, Office of University Research.

Murray, WR Smith, CC
Texas University, Austin, (RR-42) Aug. 1976, 83 pp, Figs., Apps.

Contract DOT-OS-50126

ORDER FROM: NTIS

03 173699
A TANDEM-QUEUE ALGORITHM FOR EVALUATING OVERALL AIRPORT CAPACITY. RESEARCH REPORT

Development is given for an analytical model of an airport system that can be used to evaluate overall airport capacity. Capacity is defined as the maximum flow-rate that can be imposed on airports without violating user-specified, level-of-service criteria for airport components. A deterministic queueing algorithm is presented. The approach ties individual component models together and relates input to one component and output from preceding components. Arrival patterns at airport boundaries are carried all the way through the airport; adjustments are made for delays and patterns are shifted according to service times and configuration of individual components. Successive components are treated as tandem queues. Special treatment is given to pairs of successive components between which there are ancillary activities which tend to randomize the translation of flow. For this case, input to a component is expressed as a function of output of preceding components and an estimated probability and dwelling time associated with joining intervening activities. To define these probabilities and expected dwell times, data were collected on the use of ancillary activities between major airports components; data collection technique is called the "flash-card method." Model estimates of total dwell time at a set of ancillary activities are compared with measured total dwell times; close agreement was found. The overall algorithm is intended for estimating component level of service measures. Those measures are then evaluated by the user of the model. /Author/

Park, CH Dunlay, WJ, Jr
Texas University, Austin, (RR-44) Feb. 1977, 177 pp, Figs., 102 Ref., Apps.

Contract DOT-OS-50232

ORDER FROM: NTIS

03 173820
RUNWAY IMPROVEMENT MEANS MONEY IN KALAMAZOO

The recent $2.7 million project to improve the landing facilities is indicative of the continual effort necessary to maintain the city's commitment to provide excellent air carrier service and airport facilities to a five-county area. Justification for the commitment lies in the recognition of the airport and the aviation industry as an important part of the local economy. In order to provide new Jet service to Kalamazoo, it was necessary to lengthen the 5,300 ft. main runway to 6,500 ft. and place at strengthening overlay over the entire surface. Construction of the improvements was dependent upon the receipt of federal and state grant funds. The total project included other improvements as well such as improving two taxiways and the air carrier aprons; the localizer antenna array was replaced and the location changed to conform with the runway extenions. A "keel section" binder course was placed on the existing pavement. The "design thickness" was placed at the quarter points-halfway on either side of the centerline. A 2-inch bituminous surface course was then placed over the binder course. The extensions are of full-depth asphalt pavements in which the binder and surface courses were placed over a 6-3/4 inch base.

Airport Services Management Vol. 18 No. 3, Mar. 1978, pp 22-24

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, Incorporated, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 173830
SELECTING RENTAL CAR AGENCIES AT YOUR AIRPORT

The purpose of this article is to address the problem of how many rental car operators the volume of business activities on the airport would support. The

proliferation of rental car operators carries with it the prospect of some operators reaching the point of bankruptcy in which case the airport's revenue immediately plummets to zero-in some cases after having accumulated a substantial sum due the airport. The method used in Des Moines for determining which and how many rental car operators will be permitted to operate on the airport is summarized. The method used involves a public bidding procedure. The bid procedure provides an equal opportunity for all potential operators to become airport-based rental car agencies. The bid invitation and each lease agreement clearly states certain conditions such as the limit on the number of agencies, lease terminations, premature terminations, commission rates, car rentals space, and counter space measurements. Results of this bidding procedure have been completely satisfactory, and in view of the many ramifications of this problem, it appears that this modified bid procedure may be the answer for a number of other airports.

Tharp, DE (Des Moines Airport) *Airport Management Journal* Vol. 3 No. 1, Apr. 1978, pp 4-6

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 173846
TENTATIVE AIRPORT 5 YEAR CONSTRUCTION PROGRAM
Data are tabulated relating to state, local and FAA funds for FY 77 airport construction. The name of the Airport, the county in which it is located and the type of construction (parking apron expansion, runway expansion, etc.) are noted. Air carrier airports, demonstration programs, state/local projects, general aviation, reliever, etc. are all covered.

Arizona Department of Transportation 1977, 17 pp

ACKNOWLEDGMENT: Arizona Department of Transportation
ORDER FROM: Arizona Department of Transportation, 206 South 17th Avenue, Phoenix, Arizona, 85007

03 173848
THEODORE F GREEN STATE AIRPORT. ACTIVITY PROJECTIONS, 1980-2000
This paper is one of many documents dealing with the study and analysis and future planning of the Rhode Island Airport System. Projections of key activities of the T.F. Green State Airport are made in order to support ground transportation planning. These projections will be used in identifying future facility requirements at the airport. Historical activity data are received and previous airport activity forecasts are discussed. The socio-economic indicators (population, employment, per capita income, gross national product) available for planning and deemed relative to airport activities are also discussed. The airport/socioeconomic measures are analyzed in relation to air carrier passengers and cargo and air carrier operations. General aviation operations are also covered. Projections and forecasts regarding the above operations are presented.

Rhode Island Statewide Planning Program Tech Paper 67, June 1977, 117 pp, Figs., Tabs.

ACKNOWLEDGMENT: Rhode Island Statewide Planning Program
ORDER FROM: Rhode Island Statewide Planning Program, 265 Melrose Street, Providence, Rhode Island, 02907

03 173866
AIRPORT PLANNING AND DESIGN WORKSHOP PROCEEDINGS
Two papers presented at the Airport Planning and Design Workshop are published here. The paper on the Provision of Ground Facilities for Canadian Airports, shows the 875 licensed airports in Canada, gives the yearly operational and maintennce expenditures in the order of magnitude of 150 million dollars, as well as the capital expenditures for the last 3 years. The divisions of the Air Administrations, and the objectives fulfilled by the various subdivisions are outlined. A technical organization divided into 5 subdivisions is briefly described, and various manuals covering the design, construction, operation and maintenance aspects of all ground facilities are discussed. The purpose and responsibilities of the 5 provincial aviation councils are reviewed in the second paper.

Paper presented at the Annual Conference of the Roads and Transportation Association of Canada, Quebec, 1976.

Roads and Transportation Association of Canada 1976, 36 pp, Tabs.

ACKNOWLEDGMENT: Roads and Transportation Association of Canada
ORDER FROM: Roads and Transportation Association of Canada, 1765 St Laurent Boulevard, Ottawa, Ontario K1G 3V4, Canada

03 173871
MINIMUM CONSTRUCTION STANDARDS FOR SOUTH CAROLINA AIRPORTS
Guidelines are presented for the advancement of all types of airports so that a design status can be achieved to meet minimum airport standards as required by the Federal Aviation Administration at sometime during their development process. Airport design criteria relating to wind analysis, runway length and capacity, and airspace are reviewed. Engineering design elements are detailed which relate to drainage, soil investigation, pavement thickness, bases, surface courses, testing, taxiways, aprons, turnarounds, and runway/taxiway marking. Support facilities are also covered. Governmental regulations are discussed with special reference to federal aviation, state and local requirements. Helicopter characteristics and heliport design considerations (site selection, heliports at airports, layout, approach-departure paths, obstruction clearances, helicopter parking, apron and support facilities) are also considered.

Engineering Consultants Nov. 1975, 25 pp, Tabs.

ORDER FROM: South Carolina Aeronautics Commission, P.O. Box 1769, Columbia, South Carolina, 29202

03 174013
INVERSE CONDEMNATION AS IT RELATES TO THE OPERATION OF PUBLIC AIRPORTS
This report discusses the fundamental issues in inverse condemnation as they apply to airport-related litigation. Inverse condemnation arises when the interference with property rights is perceived by airport authorities as being marginal and not requiring the payment of just compensation. If the property owner disagrees, he may go to court to recover the value of his property. In this case, the landowner institutes the action rather than the entity possessing the condemnation power. The issue of airport liability has two principal applications: zoning and nuisances. If restrictions on the use of property resulting from a zoning ordinance are less than substantial or temporary, they may be within the power of the state to control the use of the property for the general public welfare. A compensable taking interfers with the use of the property to the extent that it no longer has a reasonable and beneficial use. A nuisance in the legal context is defined as anything which annoys or disturbs a person in the free use, possession or enjoyment of his property, or which renders its use or physical occupation uncomfortable. As a result of the decision in Batten v. United States, federal courts allowed for recovery in inverse condemnation only when there were frequent and low overflights; flights caused a reduction in market value of the property; and, the overflights directly involved the plaintiffs' airspace. The Thornburg-Martin rule concludes from both cases that direct invasion of property was not essential to recovery.

Donovan, JM (Lebanon, New Hampshire Regional Airport) *Airport Management Journal* Vol. 2 No. 1, Jan. 1977, pp 2-4

ACKNOWLEDGMENT: American Association of Airport Executives
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 174015
A CHRONOLOGY OF AIRPORT PAVING
A chronology of airport paving development is presented as it relates to four specific areas: Soil mechanics; pavement thickness criteria; design and construction technology; and, aircraft gearloads. The development of the first concrete runway by the Ford Motor Company in 1927 is described. Interesting concepts were used in airport paving projects in the 1930's. Luken Field in Cincinnati, constructed three reinforced concrete runways with transverse undoweled contraction joints, and inverted crowns with drop inlets in the center of each runway for drainage. Providence Airport, had three runways with one of the conspicuous engineering achievements in connection with this project. Engineers did not have a thickness design procedure for concrete airport pavements until the modification of the Westergaard analysis in 1939. Another evaluative soil term came into use as a result of Westergaard's analysis, called "k-value" which provided a method to evaluate the "modulus of subgrade reaction" and consolidation of various soils under load. In the 1950's the concrete pavement criteria for heavier planes had been developed. The concept of continuously reinforced concrete

offered an improved method of load transfer without transverse joints. During the 1960's, slip form concrete paving streamlined and reduced the cost of paving. Many of the civil airports in use today have pavements still in service that were constructed during WWII. Westergaard's analysis formed the basis for concrete pavement design, and R.G. Packards' computer program for multiple wheel loads further redefined the pavement thickness procedure.

Cawley, ML (Associated Reinforcing Bar Producers) *Airport Management Journal* Vol. 2 No. 1, Jan. 1977, pp 13-16

ACKNOWLEDGMENT: American Association of Airport Executives
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 174016
COMPUTER SIMULATION FOR AIRPORT LANDSIDE USE
The use of computer modeling to simulate the landside facilities of a modern airport is a valuable analytical tool for the airport designer. With the simulation model, a number of design alternatives can be tested, performance specifications can be established, and design or operations alternatives can be determined. The dynamic simulation model developed and calibrated at Stapleton Airport was designed to provide a modular analytical tool capable of being adapted to similar airports. By using modules simulating the various landside processes experienced by a passenger in an airport, the closest thing to generalized model is achieved. An important feature of the control module is that it serves as a switching point to handle all intermodule transaction transfers. Another important feature is the use of scale factor which enables the model to efficiently and economically process large volumes of data input by scaling down the data. In the development and use of a dynamic simulation model it is important to verify and calibrate the model. Calibration enables the model to be modified, if necessary, to more accurately represent the real world. The use of a dynamic simulation model as an analytical tool in evaluating airport landside operations is becoming increasingly more effective. Tremendous savings can be realized in design and operation procedure by effectively utilizing models such as the airport landside simulation model.

Rosfeld, HB Wyman, FP (Bechtel Corporation) *Airport Management Journal* Vol. 2 No. 1, Jan. 1977, pp 20-22

ACKNOWLEDGMENT: American Association of Airport Executives
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 174017
THE POTENTIAL OF POROUS FRICTION COURSES
A survey conducted by the Airport Operators Council International (AOCI) to gather data on grooved and porous friction course (PFC) treatment of runway surface is described. The AOCI survey has served to provide an operational assessment by airport operators of the effectiveness of PFC as an alternative to grooving to reduce hydroplaning at airport facilities. Based on average cost data received, grooving PCC was the most expensive technique and grooving of asphalt the least expensive. PFC costs were found to be between the two. The most commonly used groove configuration in the nation was one quarter inch by one-quarter inch by one and one-half inch. That configuration on PCC cost 50% more than the same configuration on asphaltic concrete. It was found that rubber deposits and other contaminants did not build up as quickly on grooved or PFC surfaces. Those airport authorities not treating their runways reported that it was either not needed, inadequate information, or too costly. The only poor performance has been reported in Nashville, Tenn. and the reason is not readily explained, although the performance of limestone aggregate in PFC has not been clarified. The report concludes that by following the design method, quality control procedures, and good construction practices recommended, PFC pavements can be constructed with a higher degree of confidence. The success of PFC in the Rocky Mountain Region using the larger-size aggregate with a more open-textured course suggests that design may be the key to rubber build up. High-pressure water blast with a rotating spray bar for removing rubber deposits also seems to have some potential.

Duggan, LF (Airport Operators Council International) *Airport Management Journal* Vol. 2 No. 2, Apr. 1977, pp 6-9

ACKNOWLEDGMENT: American Association of Airport Executives
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 174065
A COMPARISON OF AUTOMATED PEOPLE MOVER AND ACCELERATING MOVING WALKWAY COSTS AND EFFECTIVENESS
This paper compares passenger travel time performance, capacity, initial costs, operating costs, and maintenance requirements for accelerating moving walkways and automated people mover systems. The review is based on a case study involving the satellite transit system at the Seattle-Tacoma International Airport and an accelerating moving walkway network which might have been substituted for the satellite transit system. The results of the case study indicate substantial advantages for the accelerating moving walkway alternative insofar as initial cost and travel time performance are concerned. Capacities of the two systems are comparable. Total operating and maintenance costs for the accelerating moving walkway system are concluded to be possibly substantially less than and, at most, comparable to the operating and maintenance costs for the people mover system. (author)

Bergmann, DR Conner, LR Schmelz, RE Singh, H (General Motors Research Laboratories) *Transportation Planning and Technology* Vol. 4 No. 2, Jan. 1978, pp 105-124, 6 Fig., 2 Tab., 12 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 230950)

03 174327
LIGHTING IN AIRPORT TERMINALS
The adequate lighting criteria within the airport terminals are discussed. The article presents a brief outline of the chief points to be watched in lighting the interior of an airport terminal. The non-specialist learns what he should look out for in this respect. Since the wrong lighting can defeat even the best planning and architectural intentions, the author insists that the lighting expert should be included in the planning.

Dannhauer, G *Airport Forum* Vol. 7 No. 5, 1977, pp 45-50, 3 Fig.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 174554
ROADS AND RUNWAYS: SNOW REMOVAL AND DEICING TECHNIQUES (A BIBLIOGRAPHY WITH ABSTRACTS)
The bibliography covers research reports on materials, maintenance, costs, corrosion inhibition, pollution, and the planning applied to snow and ice removal. Applications cover bridges and railroads as well as highways and runways. (This updated bibliography contains 177 abstracts, 34 of which are new entries to the previous edition.)
Supersedes NTIS/PS-76/0987, NTIS/PS-75/829, and NTIS/PS-75/061.

Brown, RJ
National Technical Information Service Bibliog. Dec. 1977, 182 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTIS/PS-77/1118/7ST

03 174773
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDY: DELAY MODEL VALIDATION PLAN
A validation plan is presented for an airside simulation model. The plan stresses basic principles of validation and inherent problems associated with comparing simulation model delay estimates with observable real-world data. A methodology is proposed that consists of three major steps: (1) evaluation of model logic, inputs, and outputs; (2) comparison of model estimates with collected data; and (3) a sensitivity analysis of the delay simulation model. A Model Validation Group, established to oversee the validation process, is described. Suggestions are given on sources of data on airside operations for model inputs and for comparisons with model estimates. (Author)

Dunlay, WJJ
Federal Aviation Administration Final Rpt. FAA-EM-77-17, Aug. 1977, 55 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A048112/7ST

03 174783
THE EFFECTS OF GEAR PATTERN ON PAVEMENT SYSTEMS PERFORMANCE

This report presents the results of a study of the effects of gear pattern on airfield pavement performance. The report presents the methodology required to express aircraft traffic in terms of passes rather than the current coverage concept. The method is capable of considering wheel interaction rather than only surface geometry. (Author)

Availability: Microfiche copies only.

Rice, JL Panak, JJ Healy, JJ
Army Construction Engineering Research Laboratory, (4A664-717D895) Final Rpt. CERL-TR-S-30, Feb. 1974, 126 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A048250/5ST

03 175365
BIBLIOGRAPHY: AIRPORTS

This bibliography was prepared to illustrate input-output procedures that have been proposed for the implementation of an Air Transportation Research Information Service(ATRIS). The proposed subject scope for ATRIS covers 21 areas that range from aircraft to travel and tourism. The subject of airports was selected as the area for initial input to the ATRIS data base from which this bibliography has been produced. The bibliography has 10 chapters on major aspects of airports, including access, environmental impact, planning and design, safety and security, operations, and management. The bibliography contains nearly 800 references that represent initial input to the machine-readable ATRIS data base. The implementation plan calls for extending the data base to full coverage of all subject areas and to provide both on-line and off-line services to the air transport community. Many of the references were acquired from data bases held by National Aeronautics and Space Administration, National Technical Information Service, Engineering Index, and other information services. Other references were prepared from documents held by various libraries and transportation centers. Selections were made by staff of the Flight Transportation Laboratory at Massachusetts Institute of Technology; final input and output processing was performed by Transportation Research Board information staff. A major purpose for the bibliography is to inform ATRIS users of the services that might be provided and through feedback from recipients of the bibliography to learn more about the needs and wants of users of air transport information. (Author)

Transportation Research Board FAA-EM-77-15, Oct. 1977, 163 pp

Contract DOT-FA76WA-3872

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049879/0ST

03 175399
RUNWAY ROUGHNESS EVALUATION LASER PROFILOMETER IMPLEMENTATION STUDY

Runway profiles and aircraft vertical acceleration responses were analyzed to develop an evaluation methodology for runway roughness and to develop roughness standards against which runways can be evaluated. Root mean square values of filtered profile data and vertical aircraft accelerations were statistically developed on a segmental basis into runway roughness standards. A methodology was developed to evaluate runway profiles against these standards; and to recommend corrective construction of the profile to reduce aircraft response. Profile roughness has therefore been based on a numerically relative basis. The establishment of runway roughness standards and evaluation methodology is considered incomplete, and additional work is recommended in this report. (Author)

Burk, DO Clark, JI
Air Force Civil Engineering Center Final Rpt. AFCEC-TR-78-1, Oct. 1977, 65 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049440/1ST

03 175460
THE FAA'S AIRPORT LANDSIDE MODEL: ANALYTICAL APPROACH TO DELAY ANALYSIS

Computer implemented analytic models have been developed which will assist in the quantitative assessment of the adequacy of the airport landside; that is, the portion of the airport property not utilized by aircraft. The primary measures of adequacy are passenger delay and passenger processing time. Detailed analytic models have been derived using queuing theory for those airport landside components which are essential to passenger processing. Also, a landside analysis program has been developed to quantify airport landside delay and capacity. The major outputs of this program are the per passenger processing times and cumulative processing times at each terminal unit and groundside area in an airport for both enplaning and deplaning passengers, and a summary of the delay and total processing times at an airport by terminal and for the entire airport. Processing time is separated into delay, service, and travel time. This program has been applied to the existing and planned facilities at the large hub air carrier airports and a large data base has been created for these large hub airports. The data base is constructed so the data can be modified or additional data input can be made in a relatively straightforward manner. (Author)

Gentry, DE Doyle, KM
HH Aerospace Design Company, Incorporated Final Rpt. FAA-AVP-78-2, Jan. 1978, 106 pp

Contract DOT-FA76WAI-643

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051145/1ST

03 175502
ASSESSMENT OF OPERATIONAL AUTOMATED GUIDEWAY SYSTEMS- JETRAIL

The report is an assessment and evaluation of the Braniff International Airlines Jetrail system located at Love Field in Dallas, Texas, the first operational completely automated, demand-responsive, group rapid, intra-airport transportation system. It connects a parking lot at the entrance to Love Field and the Braniff terminal with three-quarters of a mile of double-lane mono-rail and has ten suspended vehicles, a maintenance facility, and three stations. The system was intended to retain passengers in the face of increased congestion at Love Field. Jetrail operated successfully from April 1970 to January 1974, at which time Braniff moved to the new Dallas-Ft. Worth Regional Airport. Over six million passengers were carried 1.3 million miles during this period without a fatality or major mishap. The system did this in spite of the engineering novelty and early, low reliability of the propulsion and control system. The Jetrail system continues to be used as an engineering test-bed for a prototype linear induction motor propulsion system. This latter system, Astroglide, is being developed by PRT Systems Inc. Since the motor has no moving parts, it is more simple than the rotary motor and drive train of the Jetrail system. This report provides information on the Jetrail operational experience and the Astroglide prototype for transportation planners, designers, developers, and operators of AGT systems for intra-airport, urban, recreational, and freight applications.

Anagnostopoulos, G Wlodyka, RA Mitropoulis, IA Putukian, J Kangas, RD
Transportation Systems Center, Urban Mass Transportation Administration, (UMTA-MA-06-0067) Final Rpt. DOT-TSC-UMTA-77-55, UMTA-MA-06-0067-77-1, Dec. 1977, 276 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-278521/0ST

03 175526
EVALUATION OF A 100-WATT ELEVATED HIGH-INTENSITY RUNWAY EDGE LIGHT

The purpose of this project is to evaluate a newly designed, elevated, high-intensity runway edge light using a 100-watt lamp as its light source, rather than the standard 200-watt lamp, to determine if the lower wattage lamp and fixture combination would be satisfactory for category I and category II low-visibility operations, where a Federal Aviation Administration Specification type L-862 runway edge light fixture would be required. Pilot opinion during flight tests indicates that an installed group A version of the experimental runway edge light unit is visually adequate for category I weather operations and should be adequate for category II operations. Group A lights, however, did not meet the Office of Airport Programs Specification for L-862 runway edge lights (Advisory Circular 150/5345-48). An improved group B version will meet both requirements, since it satisfactorily passed the L-862 photometric specifications.

This is the final report of a series that includes the following two interim

reports: (1) FAA-RD-74-128, "Evaluation of an Experimental Elevated High-Intensity Runway Edge Light," and (2) FAA-RD-74-171, "Evaluation of an Experimental High-Intensity Inset Runway Edge Light Fixture".

Johnston, RE Reamer, EL
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-176, FAA-NA-77-47, Mar. 1978, 20 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051651/8ST

03 175535
MASTER PLAN: FLIGHT SERVICE STATION AUTOMATION PROGRAM
The Master Plan for the Flight Service Automation Program is a planning document for the implementation of the Flight Service Information System and serves as the acquisition authorization document. This document contains background and introductory information relating to the present system of 292 manned domestic Flight Service Stations, program objectives, requirements, planning guidelines, systems and system interface descriptions, scheduling and implementation information, relationships with other major programs, management method, logistics, staffing, training, security, and financial planning information. (Author)

Federal Aviation Administration FAA/RD-FSS-01A, Jan. 1978, 83 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052001/5ST

03 176133
CONCORDE NOISE-INDUCED BUILDING VIBRATIONS JOHN F. KENNEDY INTERNATIONAL AIRPORT
The outdoor and indoor noise levels resulting from aircraft flyovers and certain nonaircraft events were recorded at six home sites along with the associated vibration levels in the walls, windows, and floors of these test homes. Limited subjective tests conducted to examine the human detection and annoyance thresholds for building vibration and rattle caused by aircraft noise showed that both vibration and rattle were detected subjectively in several houses for some operations of both the Concorde and subsonic aircraft. Preliminary results indicate that the relationship between window vibration and aircraft noise is: (1) linear, with vibration levels being accurately predicted from OASPL levels measured near the window; (2) consistent from flyover to flyover for a given aircraft type under approach conditions; (3) no different for Concorde than for other conventional jet transports (in the case of window vibrations induced under approach power conditions); and (4) relatively high levels of window vibration measured during Concorde operations are due more to higher OASPL levels than to unique Concorde source characteristics.

Mayes, WH Deloach, R Stephens, DG Cawthorn, JM Holmes, HK
Langley Research Center NASA-TM-78660, Jan. 1978, 28 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-18873/7ST

03 176220
RELIABILITY ANALYSIS FOR AIRFIELD LIGHTING SYSTEMS
This report presents a model for performing reliability analyses of airfield lighting systems. A set of consecutive coefficients was developed to account for system failure criteria which include random light outages, consecutive light outages, and consecutive light bar failures. Probability theory and simulation techniques are used with the consecutive coefficients to determine system reliability. A computerized version of the model was used in a sensitivity analysis to determine the effect on system reliability of parameters such as unit reliability, system configuration, maintenance strategy, and unit performance characteristics. (Author)

Lindow, ES Kuo, F
Army Construction Engineering Research Laboratory Final Rpt. FAA-RD-77-148, CERL-RD-77-148, Mar. 1978, 122 pp

Contract DOT-FA66WAI-118

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A054309/0ST

03 176234
AN EMC ANALYSIS OF THE PROPOSED ASDE-3 AIRPORT SURFACE DETECTION EQUIPMENT RADAR
This report addresses the electromagnetic compatibility (EMC) between Airport Surface Detection Equipment (ASDE-3) radars to be located at major U.S. commercial airports and the communications-electronics equipments near proposed ASDE-3 sites. Three types of the environmental equipments are considered: ground-based equipments, aircraft landing systems, and airborne equipments. Predicted interfering signal levels are compared against established receiver interference thresholds to determine interference problems, and frequency management techniques are identified as potential solutions to the problems. It is determined that the recommended solutions are applicable regardless of whether ASDE-3 operates in the single-frequency or the frequency-agile mode. A follow-on study is recommended to determine the extent of ASDE-3 radar interference to certain classes of military airborne radars operating in the same frequency band. (Author)

Preis, JGJ Malicka, T
IIT Research Institute, (649E) Final Rpt. FAA-RD-77-183, Dec. 1977, 64 pp

Contract F19628-78-C-0006

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A054607/7ST

03 176275
AIRCRAFT WAKE VORTEX CHARACTERISTICS FROM DATA MEASURED AT JOHN F. KENNEDY INTERNATIONAL AIRPORT
Data from 1320 aircraft flybys at Kennedy International Airport, Jamaica, New York, in 1975 were processed and stored in a computerized vortex data management system. The data were selectively recalled to determine vortex characteristics pertinent to the design of an effective wake vortex avoidance system. Vortex and meteorological characteristics which are relevant to the design of an effective wake vortex avoidance system are discussed from an analytical viewpoint as well as from an analysis of the data. Several formulations for feedback of vortex sensor information to provide vortex prediction are presented. Several wake vortex avoidance system designs are shown. (Author)

Eberle, WR Brashears, MR Zalay, AD Shrider, KR Love, DA
Lockheed Missiles and Space Company Incorporated Final Rpt. FAA-RD-78-47, LMSC-HREC-TR-D568181, Mar. 1978, 254 pp

Contract DOT-TSC-1023

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A055059/0ST

03 176613
AIRPORT NOISE ABATEMENT PLANNING
This study examines the relationship between airports and surrounding land use and federally supported programs of airport noise abatement studies. Prior to the Noise Abatement Policy of 1976, less attention and financial commitment had been devoted by the federal government to the development by airport proprietors of broader and more comprehensive noise abatement plans. Now, however, the intent of the policy is to significantly reduce the adverse impacts of aviation noise on those impacted and achieve a substantial degree of noise compatibility between airports and their environs. An initial FAA advisory circular, although never officially issued, described a compatibility planning and implementation process for airports. Two problems made the application of this process difficult. Inadequate procedures for citizen participation, and the uncertainty as to what constituted an appropriate objective for the airport environs planning process. The Air Installation Compatible Use Zone (AICUZ), a program used by the Navy and Air Force, is designed to prevent incompatible development in high choice exposure areas, protect civilian communities from the hazards of aircraft operations, and protect the operational capability of the air installation. This concept was used in a new circular entitled "Off-Airport Land Use Planning: Airport-Environs Compatibility Planning." Preparation of the compatibility plan will be accomplished through a cooperative effort between the airport sponsor and the local planning agency with input from both airport users and residents of the airport's environs. The Environmental Protection Agency (EPA) has also set

forth its own methodology for conducting aircraft noise impact analysis. This procedure, called the Airport Noise Evaluation Process (AWEP), is described and compared with the FAA's Airport Environs Compatibility Planning.

Robert, CV *Airport Management Journal* Vol. 2 No. 3, Oct. 1977, pp 10-13

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 176615
EVALUATING THE FEASIBILITY OF AIRPORT FOG CLEARANCE
This article discusses the major points that must be considered when evaluating the practicality of fog dispersal systems. Fog forms in several ways and can be classified as radiation (ground fog), adviction, frontal, and upslope. Considerable success has been achieved in dispersing supercooled fogs because supercooled fogs droplets can be converted into snowflakes which fall to ground. Warm fogs can be heated to evaporate the fog droplets. It is noted that 95% of the fogs that disrupt airline operations are warm fog types. In evaluating the feasibility of fog clearance, it is important to consider fog climatology, schedules of aircraft operations, the physical characteristics of the airport, cost of installation and operation of equipment, and environmental effects. Some consideration should also be given to local sources of pollution which may produce nuclei increasing the frequency of fog formation. Although fog dispersal appears to be technically feasible, a thorough cost/benefit analysis is a determinant in any plans for a program to enhance visibility in fogs at an airport.

Buxton, EB *Airport Management Journal* Vol. 2 No. 3, July 1977, pp 6-7

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 176617
LESS IS MORE
The "less is more" concept is applied to less walking distance at airports in relation to more passenger convenience. Passenger convenience, both at the origin and destination of his trip, usually refers to physical and mental comfort. The former relates to the walking distance from parking areas, long concourses to the departure lounges, and baggage carrying distance. The latter refers to waiting times, speed of check-in, queuing lines, direct non-stop flights, and direct landing approaches to airports. Long walks for passengers are the result of excessive horizontal development of terminals, parking areas and gates. When the walking distance increases beyond 600 ft. then it becomes desirable to use horizontal or vertical people movers. The energy crisis has not only reduced the frequency of non-stop flights, but also has required larger aircraft to accommodate increasing peak-hour loads. Excessive walking distances at airport terminals are largely the result of the construction of fingers to meet airline requests for more exclusive gate positions. Of the two basic concepts of terminal design, control and unit, the former is preferred from a passenger's point of view because all passengers are routed to a central ticketing area, travel information is more accessible, and transfers are quicker. People movers are becoming more popular at airports as a result of increasing congestion and longer walks between landside and airside. A new medium-range aircraft for the 1980's equipped with "quiet" fuel efficient engines and a smaller wing span and fuselage length, is expected to have a positive effect on passenger convenience and walking distances. Lastly it is noted that access into and out of major airports is directly tied to the need for greater capacity in the road system on or near the airport.

Meehan, JA *Airport Management Journal* Vol. 2 No. 3, July 1977, pp 18-21

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 176618
RELIEVER AIRPORTS
Reliever airports are broadly defined as a general aviation airport having the primary function of relieving congestion at an air carrier airport by diverting from such airport general aviation traffic. Unless the reliever airport is placed in an area accessible to the potential aircraft owners and users, it will not develop levels of traffic which provide significant relief or economic utilization. This article is concerned with the appropriate measurement to determine the accessibility aspect of airport planning and development for general aviation airports. The Omaha Airport Authority conducted an aviation market analysis criteria and the study methods and findings were found to be universally applicable. Three factors strongly affect the ownership of general aviation aircraft in any local area: population, family income, and proximity to an airport. These factors are discussed as well as the relationship between family income and aircraft ownership, and accessibility and aircraft ownership. Combining the methods of determining potential aircraft based on population and income, and the percentage of potential realized based on accessibility, a community can evaluate potential airfield sites as to their ability today and in the future to generate general aviation aircraft. Airport accessibility is not the only determinant in the selection of a new airport site. Airspace, the surrounding land use, and the availability of land for meeting present and future expansion needs must also be considered.

Brown, JF *Airport Management Journal* Vol. 2 No. 3, July 1977, pp 22-24

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 176619
SWEDEN'S LATEST--AND LAST?
The new Gothenburg/Landvetter Airport is ideally located in the industrial belt which runs through the central countries of Sweden and into the West of the country. The new airport was a joint venture by the State, three municipalities, and four countries. The site chosen for the airport was in an area of forest, lakes and moorland, on a rocky plateau 150m above sea level and 50m above the surrounding land. A good deal of attention was paid to environmental considerations during the detailed design of the facilities-in particular to the integration. High speed turnoffs from the runway form the link with the apron. Also in the terminal area are parking stands for passenger aircrafts air cargo, and general aviation. Paved surfaces on the aircraft are designed to provide single-wheel bearing strength sufficient to allow normal aircraft operations, including the DC-10. The design capacity of the terminal is three million passengers a year and is fully equipped with arrival/departure lounges for international and domestic passengers, a VIP lounge, and conference room. In the air cargo terminal area, speeded procedures have been adopted for more efficient cargo handling. The Immediate Release System developed by the Swedish Customs, nose-in docking, and an advanced data system (CARIN), all have contributed to greater efficiency. Landvetter is the first Scandinavian Airport to have an aircraft noise ombudsman, taking care of complaints from local residents. The average noise level over a 20-hour period was 70 dBA.

Thinesen, J *Airports International* No. 65, Feb. 1978, pp 8-11, Phots.

ACKNOWLEDGMENT: Airports International
ORDER FROM: IPC Transport Press

03 176623
AIRFIELD PAVEMENT SMOOTHNESS REQUIREMENTS
This investigation was undertaken to determine the influence of airfield pavement surface roughness upon aircraft operations and to develop more realistic airfield pavement surface smoothness criteria for the construction of new airfield pavements based upon aircraft and aircraft crew operational requirements. The human response criteria to whole body vibration were selected as the criteria for assessing the severity of aircraft response resulting from ground operations. Field tests were conducted using instrumented aircraft to measure the acceleration response of the aircraft at three locations within the fuselage during a series of ground operations. The profiles of the test site runways were also measured. Aircraft response data were measured for both the B-52 and the Boeing 727 aircraft. Runway surface measurements were also made at a number of civil airports where slip-form pavers had been used during construction of the pavement systems. These measurements were used to evaluate the level of roughness that might be anticipated when slip-form pavers are used. An analytical investigation of runway roughness was conducted using an aircraft simulation computer code developed by the Air Force Flight Dynamics Laboratory, and hypothetical runway profiles as the forcing function. Profiles were varied in amplitude frequency, and form. The results of analytical parametric study were analyzed with respect to the vibration tolerance level of humans to evaluate the current Corps of Engineers (CE) runway smoothness criteria for the construction of new runway pavements. Based upon the results of this

investigation, minor modifications of the current CE criteria are recommended.

Horn, WJ
Waterways Experiment Station Final Rpt. Tech Rpt. S-77-12, Nov. 1977, 132 pp

ACKNOWLEDGMENT: Waterways Experiment Station
ORDER FROM: NTIS

AD-A050921

03 176629
TERMINAL AIRSPACE/AIRPORT CONGESTION DELAYS
The FAA and the airlines have undertaken a joint program with the airport operators to reduce the serious congestion delays at major airports. This paper describes the initial such study, which was conducted at O'Hare, covering a description of the problem, the types of analyses conducted, and the study findings and recommendations. /Author/

Hubbard, HB (United Airlines) *Interfaces* Vol. 8 No. 2, Feb. 1978, pp 1-14

ACKNOWLEDGMENT: Interfaces
ORDER FROM: Institute of Management Sciences, 146 Westminster Street, Providence, Rhode Island, 02903

03 176657
SIXTY YEARS OF SOVIET AVIATION GROUND LIGHTING ENGINEERING [60 let razvitiya Sovetskoi nazemnoi aviatsionnoi svetotekhniki]
The main characteristics of the airport lighting equipment developed, made, and operated in the USSR over the last 60 years are given. LIkewise, the most important research works comprising theoretical justification of the accepted parameters of the light signaling equipment for airports, developed and operated in the country, are set forth. In addition, criteria for the evaluation of the difficulties of landing according to the ICAO categories and the illuminating engineering characteristics of the light signaling equipment for all the categories of landing difficulties according to ICAO are pointed out. [Russian]

Frid, YV *Svetotekhnika* No. 11, Nov. 1977, pp 9-12

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 176729
CONSOLIDATE LISTING OF FAA CERTIFICATED REPAIR STATIONS
No Abstract.

Federal Aviation Administration AC 140-1J, 1977, 78 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

TD4.8/5:140-1J

03 176736
AIRPORT FIRE FIGHTING VEHICLES
This article discusses the range of airport fire fighting vehicles that are presently available. The International Civil Aviation Organization's (ICAO) guidelines for airport fire fighting vehicles classifies airports according to the various types of aircraft handled. These catagories determine the amount of fire extinguishing agents considered necessary to be held available. The guidelines also produced the following design characteristics for fire fighting vehicles: Rapid intervention vehicles; major vehicles; and equipment for rescue operations. The firms that are active in the fire fighting vehicle sector offer a wide range of vehicles including crash trucks, airfield fire fighting vehicles, crash/rescue vehicles with articulated steering, airfield tenders, rapid intervention vehicles, and light rescue vehicles.

Kasten, I *Aerospace International* Vol. 14 No. 1, Feb. 1978, pp 16-26

ACKNOWLEDGMENT: Aerospace International
ORDER FROM: Aerospace International, Heilsbachstrasse 26, 5300 Bonn 1, West Germany

03 176827
INTERNATIONAL CONFERENCE ON CONCRETE PAVEMENT DESIGN, 1977
Proceedings include 35 papers that present information on the design of concrete pavements and runways for airports, for roads and streets of all classes, and for specialized uses. The primary objective of the conference was to present latest information of economical and practical aspects of portland cement concrete design. The papers in this proceedings are grouped according to the format selected for the program as follows: State of the Art, Design Principles, Airport Pavements, Highway Pavements, Bases, Subgrades and Drainage, and Joints, Maintenance Strategies and Innovations. Selected papers are indexed separately.

International Conference on Concrete Pavement Design, Purdue University, February 15-17, 1977.

Purdue University Proceeding 1977, 600 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 176828
WARNING AND MARKING COLOURS ON THE APRON
The article indicates the importance of the uniformity and consistency in colored markings on airports. Aircraft and vehicle movements within the grounds of a busy airport create many safety problems. This is true first and foremost of the apron, where the different kinds of users meet. However, the damper can be greatly reduced by a rational use of warning and marking colors.

Brenner, R *Airport Forum* Vol. 7 No. 5, 1977, p 38

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 176829
TESTING AND EVALUATION OF CONCRETE AIRPORT PAVEMENTS
This report presents a test method by which it is possible to rapidly obtain information on bearing capacity and homogeneity of concrete runways built on cement treated subbase materials. A light vibrator is used for this type of testing, and the measured deflections are brought into a precise relationship with the results of full-scale tests carried out with loads corresponding to those of a B 747 landing gear. The method is based on field experience from the runways of Zurich International Airport.

International Conference on Concrete Pavement Design, Purdue University, February 15-17, 1977.

Scazziga, IH (Federal Institute of Technology, Switzerland)
Purdue University Proceeding 1977, pp 497-506, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 176830
RIGID PAVEMENT DESIGN FOR AIRFIELDS
A review of all existing design and construction methods is presented with the aim of selecting, developing, and applying a simple, practical, and uniform method of design. The objectives of the system were: to obviate the use of untried methods; to ensure adequate performance; to eliminate variation occasioned by cost differentials of local and competitive materials; to avoid reductions of pavement thickness or quality in order to balance cost; and to establish procedures for further development of design methods through tests, investigations, and study of actual pavement behavior.

International Conference on Concrete Pavement Design, Purdue University, February 15-17, 1977.

Sale, JP (Waterways Experiment Station)
Purdue University Proceeding 1977, pp 1-18, 16 Ref.

ACKNOWLEDGMENT: EI
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03 176894
TURBOCLAIR PROVED EFFECTIVE FOR RUNWAY FOG DISPERSAL
A thermokinetic fog dispersal system using surplus jet engines has been developed. Tests have shown that Turboclair has the capability to increase the regularity of air transport operations while enhancing the safety factor, since the critical landing phase under such atmospheric conditions takes place in IFR and visual contact with the runway must be assured before touchdown. This technique has made use of turbo-jet engines which are set into concrete pits which are aligned at specific intervals along the landing runway. They are equipped with a mechanism for the diffusion of warm gases which are blown through rotatable gratings. Taking the wind into

account, a computer determines the direction in which the gratings must be set to maintain the desired cleared air volume over the runway. A control center ensures the remote start-up and supervision of the overall installation. Details are given of the test programme, the operational procedure and the results.

de Pemorel, C *ICAO Bulletin* Vol. 32 No. 10, Oct. 1977, pp 14-17

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

03 176907
SOIL ENGINEERING IN LAND TRANSPORT [La ingenieria de suelos en las vias terrestres]
This book discusses some of the most salient points of the application of soil mechanics in the field of highway, rail and airport design. Chapter VIII deals with the foundations of bridges and overpasses. Chapters IX and X tackle the subject of flexible and rigid pavements. The first part of Chapter XI is dedicated to surface drainage works and the second to the methodology that has been gradually adopted in Mexico for carrying out highway and railway-oriented geotechnical studies. Chapter XII deals with highway operation. Chapter XIII, field instrumentation, describes the present techniques permitting the evaluation of the performance of existing structures, verification of design assumptions and detection of incipient failure thus allowing the timely use of corrective measures. Chapter XIV discusses the excavation of tunnels through different soils, pressures and behaviour of various surfacings, as well as the settlement of the terrain. Chapter XV covers various subjects, scour, vibro-flotation, anchoring and collapsible soils. Chapter XVI deals with soil consolidation techniques, physico-chemical methods in particular. Chapter XVII reviews the methods for controlling the quality of overland transport ways. [Spanish]

Rico, A Delo, AA
LIMUSA Monograph Vol. 2 1977, 643 pp, 440 Fig., 114 Tab., 144 Phot., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-231651), Ministry of Public Works, Spain
ORDER FROM: LIMUSA, Arcos de Belen 75, Mexico DF, Mexico

03 177012
AIRSPACE UTILIZATION CONSIDERATIONS IN THE PROPOSED CONSTRUCTION, ALTERATION, ACTIVATION AND DEACTIVATION OF AIRPORTS
No Abstract.

Federal Aviation Administration Sept. 1977, 5 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.8/5:70-2B

03 177018
PALO ALTO AIRPORT TOWER OPERATIONS
No Abstract.

McKoy, BG Travis, F Hannan, B
Automated Business Services, Incorporated, Federal Aviation Administration FAA-AVP-77-21, Mar. 1977, 97 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: NTIS
AD-A039891/7ST

03 177019
HELIPORT DESIGN GUIDE
No Abstract.

Federal Aviation Administration Aug. 1977, 99 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
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03 177020
COMMUTER AIRLINE AIRPORT FACILITIES: STUDY OF FOUR AIR CARRIER AIRPORTS
No Abstract.

Federal Aviation Administration DOT-FA77WA-3925, Apr. 1977, 56 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.2:C73/5

03 177022
ACCESS TRAVEL--AIRPORTS: A GUIDE TO ACCESSIBILITY OF TERMINALS
No Abstract.
Published in cooperation with Airport Operators Council International Inc., and Architectural and Transportation Barriers Compliance Board.

Federal Aviation Administration 2nd Ed. Oct. 1977, 19 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.8:T67/3

03 177339
GOETEBORG-LANDVETTER, SWEDEN'S NEW AIRPORT
This airport was opened to traffic in October 1977. It replaces the old field at Torslanda, which had served Sweden's second-largest city ever since 1923. In some respects, a very individual approach was adopted in designing the new airport.

Uppman, R Wessel, J *Airport Forum* Vol. 7 No. 6, Dec. 1977, p 27

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178071
BRISBANE AIRPORT DEVELOPMENT. FLOODWAY STUDIES
This report describes investigations carried out to determine the design and characteristics of the Floodway which must carry the flood waters of Kedron Brook past the proposed new Brisbane Airport in Australia. Four separate but related investigations were involved in the Floodway Study and included theoretical studies with mathematical model, physical model studies, local drain studies, Stage V, and tidal inlet studies. The more important findings of the four studies are summarized.

Apelt, CJ *Queensland University Dept of Civil Eng Bulletin* No. 19, Aug. 1977, 167 pp, 17 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178264
REPAIR OF CONCRETE PAVEMENTS USING SYNTHETIC RESINS
The paper describes the experience gained on repair of rigid airfield pavements with resins, and highlights a simple device to lift sunken slabs, which has proved successful.

Ghosh, RK (Central Road Research Institute, India) Phull, YR Pant, CS *Indian Roads Congress, Journal of* Vol. 37 No. 3, Oct. 1976, pp 383-453, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178268
RESURFACING OF AIRPORT RUNWAYS AND TAXIWAYS
The paper considers the problems of maintaining and strengthening runways and taxiways without disrupting airport operations. It suggests that this can best be effected by resurfacing with asphalt during periods that normally have little traffic, with the pavements open to traffic at other periods. This method avoids taking the pavement out of commission for a lengthy period. The steps taken to minimize disruption to airport operations, maintain safety standards and ensure that aircraft can use the pavements between working periods are discussed. Examples are taken from recent projects at Prestwick, Gatwick and Heathrow Airports. Phasing and timing of works, design details, provision of temporary ramps, aviation ground lighting and daytime

markings, and the importance of cleanliness are covered. Difficulties experienced by the contractor from the intermittent possession of the working area and the need to work at night are discussed. The paper concludes by claiming that although this method of intermittent working probably has a higher capital cost than conventional methods, when costs of delays to passengers and airlines are taken into account it is cheaper. The satisfactory performance of the pavements since the resurfacing shows that the method is a practical proposition for busy airports with traffic patterns similar to those of Prestwick, Gatwick and Heathrow. /Author/

Newton, K *Institution of Civil Engineers, Proceedings* Vol. 62 Feb. 1977, pp 119-32, 6 Fig., 5 Tab., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-225076)
ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England ESL

03 178326
EVALUATION OF ROADWAY GUIDE SIGNS AT A LARGE AIRPORT
Research study described introduces the guide signs leading to major destinations at Toronto International Airport thereby improving traffic flow and making road selection easier. Using both laboratory and field techniques, the study team confirms the validity of the former for sign evaluation.

Dewar, RE Ells, JG Cooper, PJ *Transport Engineer* Vol. 47 No. 6, June 1977, pp 19-23, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178455
LAND USE PLANNING AND TRANSPORTATION [Raumplanung und Verkehr]
The premise is made that all mechanical forms of transport constitute a nuisance and bring about damage and that an inequitable degree of transport will lead to collective immobility. In four theses the aims for land use planning in relation to transportation are formulated. A reduction in the need for mechanical transport is demanded and of forced travel or else a promotion of voluntary mobility. Similarly there should be a demand for collective transport or, where this is unsuitable, for community transport (e.g. Taxis). Individual transport should become excluded in all but extremely thinly populated areas. The then employed form of energy and its environmental benefit deserves great consideration in these problems. A further aim in land use planning should be the preservation of unpopulated and thinly populated areas by the appropriate configuration of the populated areas. One must understand by this a "small centre" interaction based upon sociologically and functionally different areas of life. By reducing the size of settlement or by raising the density of population it will be possible to forego the use of mechanical transport within each unit. Finally a plea is made for human rights in planning rather than for traffic rights. /TRRL/ [German]

Gruen, V (Zentrum fuer Unnweltplanung, Austria) *SIR-Mitteilungen und Berichte* No. 1, 1977, pp 13-28

ACKNOWLEDGMENT: TRRL (IRRD-306479)
ORDER FROM: Salzburger Institut fuer Raumforschung, Postfach 2, Salzburg, Austria

03 178464
OVERVIEW OF AIRFIELD PAVEMENT DESIGN
Airfield pavement systems should be considered within a framework which includes maintenance and rehabilitation as well as initial design for some prescribed time period. Portions of this management system will be briefly discussed in this paper. While there are no workable systems which completely describe the airfield pavement management process, there are a number of subsystems which when used in conjunction with one another do provide the engineer concerned with design and rehabilitation a framework within which to make reasonable decisions. It is these subsystems which will be addressed herein. In this overview of pavement design and rehabilitation an attempt has been made to summarize representative existing methodology and the results of recent research which is considered implementable and which permits expansion of the scope design and rehabilitation. The recent research when used in conjunction with existing methodology permits expansion of the scope of design and rehabilitation, e.g., insuring more effective use of marginal materials, for large or unusual projects, or to ascertain the influence of the introduction of different mixes of aircraft.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Monismith, CL (California University, Berkeley)
American Society of Civil Engineers Proceeding 1977, pp 256-324, 75 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178467
IMPACT OF FUTURE TECHNOLOGY AIRCRAFT ON AIRPORT FACILITIES--THE INTERNATIONAL VIEWPOINT
This paper explores the impact of aircraft on airports from a slightly different viewpoint. The author provides some data on airports other than those in the United States, giving a better perspective on the situation that exists throughout the rest of the world. The author also reviews the international specifications for airports, and comments from the airport engineer's viewpoint on the possible impact of new aircraft.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Wilde, KK (International Civil Aviation Organization)
American Society of Civil Engineers Proceeding 1977, pp 398-404

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 178576
RECONSTRUCTION OF AIRPORT MANOEUVRING SURFACE PAVEMENT [Rekonstrukcija kolnika manevarskih povrsina aerodroma]
Reconstruction of airport manoeuvring pavement, the runways in particular, is frequently undertaken. Existing pavements are either worn out or their bearing capacity is not sufficient to support the heavy aircrafts used today. Therefore they have to be strengthened. Runways are usually made of rigid and flexible pavement. The use of rigid pavement is more widespread. The reconstruction of both types of pavement has to be done gradually. The whole operation includes the preparation and improvement of the existing pavement and the construction of the new pavement. The methods of pavement design vary depending upon the type of existing and new pavement. The article points out that the same methods can be used in the reconstruction of road pavements. /TRRL/ [Croatian]

Horvat, Z (Gradjevinski Institut, Yugoslavia) *Ceste i Mostovi* Vol. 23 No. 12, Dec. 1977, pp 369-376, 1 Fig., 2 Phot., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 232712)
ORDER FROM: Drustvo za Ceste Hrvatske, Ul. Janka Rakuse 1, Zagreb, Yugoslavia

03 178578
CONVENTIONAL METHODS OF PAVEMENT DESIGN FOR AIRPORTS [METODI TRADIZIONALI DI CALCOLO PER PAVIMENTAZIONE AEROPORTUALI]
Following an examination of the various parameters affecting the durability and strength of airport pavements, a review is presented of the increase in plane loads and landing gear. The equivalent load per single wheel of multiple undercarriages is defined, and various methods of pavement design (flexible and rigid) are analyzed by tables and graphs. Worked examples are given of the following methods of calculation: the CBR method; the US Navy method (mainly basd on Burmister's theory); the Portland Cement Association method; and the LCN (lead classification number) method. /TRRL/ [Italian]

Dalna, GE, Jacopino, G (Politecnico Di Torino) *Strade* No. 5, Sept. 1977, pp 347-360, 25 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 233009)
ORDER FROM: Permanent International Assoc of Road Congresses, Via Andreani 4, Milan, Italy

03 178579
BITUMINOUS MIXTURES WITH TRINIDAD ASPHALT AS AN ADDITIVE. EXPERIMENTAL RESEARCH FOR AIRPORT PAVEMENTS [Sui conglomerati bituminosi additivati con asfalto trinidad. ricerche sperimentali per le applicazioni ai manti di sovrastrutture aeroportuali]
Trinidad asphalt has recently been used as an additive in bituminous mixtures for airport pavements (parking areas at the head of the runway at Munich and Bremen airports, Germany). A section of the Rome outer ring road which carries intense traffic containing a high percentage of heavy

vehicles, has also been experimentally paved with this type of mixture. In comparison with conventional mixtures, results have shown an appreciable improvement in mechanical characteristics (stability and resistance to wear), and in resistance to the aggressive action of aircraft fuels. The mixes containing Trinidad asphalt maintain their stability and viscosity through temperature variations, and provide good skid resistance. This article gives an indication of the optimum percentages of Trinidad asphalt to be used, as obtained from the results of laboratory tests. /TRRL/ [Italian]

Tesoriere, G (Palermo University, Italy) Reina, G *Strade* No. 5, Sept. 1977, pp 339-345, 5 Fig., 4 Tab., 6 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 233008)
ORDER FROM: Permanent International Assoc of Road Congresses, Via Andreani 4, Milan, Italy

03 178733
EUROPE'S LEADING AIRPORTS: MEETING THE CHALLENGE TO THE YEAR 2000

This article describes the steps contemplated by the airport authorities of Amsterdam, Frankfurt, London, and Paris, to meet the problem of increased traffic flow. (Annual growth rates have been projected of 7.8 percent for passenger traffic and 9.2 percent for cargo.) In Amsterdam, the present capacity of 19 million is expected to hold good until 1986, when several new facilities would be needed, including a new passenger terminal, a fifth runway and extra bonded warehouses. However, because of the the need for lead time, construction of the second terminal must commence in 1981 if the airport does not want to be caught with a capacity shortage in the late 1980s. Although the airport is already reasonably well connected to the city center, a new railway link to Amsterdam will also be opened in 1978, with one to the Hague scheduled for 1981. Frankfurt Airport has capacity to spare room to expand, excellent passenger services, and for the number of passengers handled, ranks among the most efficient European international airports. However, th runway threshold at the eastern end is not suitable for the installation of advanced equipment, due to the presence of a highway. The airport is awaiting a government decision on the shifting of both runway thresholds to the west and on the building of a new west runway perpendicular to the present two and of the same length (13,000 feet). In London, air traffic is expected to increase from the present 31 million a year to over 70 million by 1990, and increasing the capacity of the area's four airports may be difficult. Heathrow, the areas principal airport, is currently operating close to capacity and has a layout (The facilities are placed between the runways) which precludes easy expansion. A proposed new terminal would, if built, have to be sited away from the central area. The other three airports have greater potential for expansion, but there are complications. While Gatwick has excellent facilities which can be easily expanded it is hampered by its having only one runway. Stansted can be greatly expanded, but there would be considerable opposition to such development on environmental grounds (as would be the case with adding a runway at Gatwick). Luton can also be expanded, but it is under the jurisdiction of the Luton Town Council which would not necessarily agree to the proposals of the British Airports Authority, which manages the other three. In Paris, the new (opened in 1974) De Gaulle Airport is, by virtue of the Modular design of the terminal, capable of considerable expansion at comparatively little cost. The first section of a second terminal and a second runway are due for completion in 1981. There is a problem due to the lack of demarcation between types of operation at De Gaulle and Orly, with different airlines running flights to the same points from different airports.

Tallon, P *Interavia* Vol. 33 May 1978, p 513, Phots.

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

03 178734
NARITA: CONTROVERSIAL OPENING ONLY THE START OF DIFFICULTIES

Besides the physically violent opposition from extremist groups that has delayed its opening for years, Tokyo's new international airport faces other problems as well, and, in fact, serves as an admonition to others on the need for long-term planning in the construction of major termini. Narita is extremely far from the city it serves (It is second only to Sao Paulo International in this respect), being 40 miles from downtown Tokyo and relatively inaccessible. The only means of public transport to the airport from Tokyo are a train to Narita City followed by a 20 minute bus ride or a direct bus route which can take anywhere from 70 minutes to an hour and one half. Furthermore, there is local opposition to a proposed fuel pipeline from Chiba, thus leaving Narita's ever having a suitable fuel supply system in doubt. Among the problems regarding flight operations at Narita is that of restricted air space, what with its being surrounded by three major facilities (Haneda Airport plus two air force bases-one American, one Japanese). It is feared that the intricate procedures required in such a complex environment could lead to pilot error, especially by foreign crews. Although most international flights currently at Haneda will move to Narita, the airport will be obliged to limit the number of flights far below its capacity because of fuel supply, air space, and curfew problems. Narita has also come under fire from the airlines for its high landing fees and its severely limiting the number of additional airlines that can use the airport.

Interavia Vol. 33 May 1978, pp 570-571

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

03 179387
COORDINATING GROUND TRANSPORTATION--AN AIRPORT MANAGER'S VIEW

The coordination of ground transportation at a major airport includes such things as making a determination of the types of airport ground transportation to be provided to the public as well as a determination of the interface between the categories of ground transportation, the selection of ground transportation operators, and the type of operation best suited to the particular airport or community involved. Most airport ground transportation systems include taxis, limousines, and buses. In addition, most airports will have a variety of special types of transportation that include wheelchair vans, ambulances, hotel and motel courtesy cars, car rentals, and speciality buses. It is noted that the interface between these categories must receive special attention if the public is to receive proper service from each of them. The selection of ground transportation operators by bid or negotiation is discussed. Problem areas such as labor disputes level of service, and competing modes are also discussed. Solutions to these problems are made easier for the airport authority if there is only one responsible ground transportation operator. An effective coordination of airport ground transportation services cannot be accomplished without a close and cooperative relationship between the airport operator and the ground transportation operator. A poor relationship is to the disadvantage of both as well as to the public which is being served and must be avoided at all costs.

Wagener, LE *Airport Management Journal* Vol. 3 No. 2, July 1978, pp 21-23

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

03 179390
AIRPORTS GROUND ACCESS: TRAFFIC MANAGEMENT CONCEPTS

This article presents a traffic management technique that would charge the motorists who enter the airport to pickup or discharge passengers. These motorists who use the airport roadways add to the overall traffic volume within the airport thereby contributing to traffic congestion during peak periods. The airport access fee would eliminate the movement of "thru" traffic which uses the airport roadways as a "short-cut" or to by pass traffic congestion or nearby arterial highways. This access toll operation is presently being used at such airports as Dallas-Fort Worth and at Naples, Florida. Several airports levy a user charge on taxis by means of a coin-operated gate at the entrances to the taxi holding lots. The access charge, it is noted, should be a uniform toll. The toll is an untapped source of revenue for the airport agencies and could be used for needed improvements such as increasing the capacity of the internal roadways for better traffic circulation, and to offset increases in fees for other airport services. This toll could be used as a traffic management toll in terms of pricing, subsidize remote parking and shuttle bus operations, and as a revenue source to offset the escalating operating expenses of airport operations in general and the maintenance of ground transportation facilities in particular.

Goldberg, AH *Airport Services Management* Vol. 18 No. 6, June 1978, pp 22-24

ACKNOWLEDGMENT: Airport Services Management

ORDER FROM: Lakewood Publications, Incorporated, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179391
THE WORLD'S LARGEST HANGAR
Hangar V of the Lufthansa Base at Frankfurt's Rhine/Main Airport is the world's largest aircraft maintenance building. It provides a working space of 300,000 square feet. The interior of the building has a minimum clearance of 82 feet. The hangar provides four main servicing areas in which four 747's can be worked on abreast but these can be lengthened another 13 feet should the need arise. The hangar is in use day and night therefore a great deal of attention was given to ensuring efficient lighting at a reasonable cost. One quarter of the room area is skylight and at night, 156 metal halid vapour lamps light up the whole working area. Heating tubes are embeded in the floor; radial roof air heat both floors and working areas. The building also has its own power supply. Other facilities include a large number of fire fighting gear; two tramrail underhung cranes; docking facilities; and a computer system which monitors servicing and maintenance of the entire fleet. The computer also does engine running time calculations, flight-hours registration, and spare parts inventory and movement.

Airport Services Management Vol. 18 No. 6, June 1978, pp 17-19, 4 Phot.

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, Incorporated, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179742
PLANNING FOR AIRPORT ACCESS: AN ANALYSIS OF THE SAN FRANCISCO BAY AREA
A multidisciplinary systems analysis of airport access to the major airports of the San Francisco Bay Area has been made. Basically, it was found that there is no major airport access problem. The argument of the report is that commonly perceived airport access problems are either (1) minor inconvenience magnified out of proportion by a combination of the traveler's unreasonable expectations, anxiety over flight departure and lack of information, or (2) not subject to solutions which do not consider the entire urban transit system. Nine specific conclusions and recommendations for improvement are presented and discussed. /Author/
1977 Summer Faculty Program on Engineering System Design.

Dajani, JS Jucker, JV Jones, JL
Stanford University, Ames Research Center, (A-7347) NASA-CP-2044, May 1978, 285 pp, Tabs., Apps.

Contract NGR 05-202-409

ACKNOWLEDGMENT: National Aeronautics and Space Administration
ORDER FROM: NTIS

03 179853
THE DEVELOPMENT OF THE UK AIRPORT SYSTEM
This paper discusses the nature of the transition facing the UK airport system. This transition is from a feeder/hub pattern of airports with a single hub to one in which a small number of regional airports offer a network of air services commensurate with that available at Heathrow. Sound policies in airport planning must be based on encouraging and fostering those forces which are to the long-term advantage of air travellers as a whole, while not ignoring the interests of those who may be adversely affected by the growth of aviation. There is a need for sound policies which can be flexibly applied, rather than for any rigid blue-print in which each airport is allotted a clearly specified role, in terms of air services or total volume of traffic. It is further necessary to identify those airports best fitted to become the major regional airports of the future, and provide a measure of protection to international services at these airports until they are well established and able to withstand competition from smaller airports. The continuing operation of smaller airports should reflect the needs of the travelling public and enable legitimate interests to be expressed without undermining the wider benefits accuring from the development of major regional airports.

Civil Aviation Authority, England CAP 372, Mar. 1975, 14 pp, 1 App.

ACKNOWLEDGMENT: Civil Aviation Authority, England
ORDER FROM: Civil Aviation Authority, England, Aviation House, 129 Kingsway, London WC2B 6NN, England

03 179873
A GUIDE TO CONCRETE ROAD CONSTRUCTION (THIRD EDITION)
The third edition of this guide, which is in question and answer format, includes sections on subgrades and sub-bases, design, reinforcement, joints, concrete and quality control, construction and plant, separation membrane, surface finishes, edge details and road markings, maintenance and repairs. A section is also included on special construction, in particular continuously reinforced concrete paving and block paving. Both conventional fixed form paving and slip form paving methods are covered, with all the ancillary plant and equipment used in a modern concrete construction project. References to current specifications and to more extensive reading are included. Some information is given on concrete paving work similar to road construction, such as car parks, container depots and some aspects of airfield construction.

Her Majesty's Stationery Office Vol. 3 1978, 82 pp, Figs., 3 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-232204)
ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

03 179878
HOW RETROREFLECTIVE EDGE MARKERS WORKED IN NEW YORK
This article describes the experience of the Port Authority of New York and New Jersey with retroreflective markers. An ethylene vinyl acetate (EVA) post marker with suitable retroreflective bands which stand 24 inches high was chosen because it provided good flexibility and high resistance to low temperature brittleness. A retroreflective material in which an inherent enclosed microprism structure serves as the reflective medium was found to conform and bond without problems. The taxiway edge markers completely eliminate pilot confusion. Prototype edge markers were first installed at La Guardia Airport in October 1972 and later at Kennedy International. Overall response to reflecterized markers have been positive.

Airport Services Management Vol. 18 No. 7, July 1978, pp 35-36, 2 Phot.

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179879
BRACING FOR THE BIGGER JETS: REINFORCED RUNWAY, AND TAXIWAYS AT WILMINGTON, N.C.
To better withstand increasing jet traffic, a stress-resistant new surface has been applied to a 20 year-old runway and adjacent taxiways at New Hanover County Airport. Protection against reflective cracking is provided by nonwoven polypropylene fabric combined with asphalt to form a stress relieving membrane. The resurfacing of the runway was completed in the summer of 1977 and subjected to the particular freeze/thaw cycles of the 1977-78 winter, with satisfactory results to date. Cracks in the 20 year-old runway were routed out and filled. Then, preceded by a coat of asphalt cement, the fabric was applied on either side of the centerline on the whole runway except for 3 control strips. Asphalt was then applied to both runway and taxi strips. The runway is now capable of supporting the heaviest medium range commercial jets.

Airport Services Management Vol. 18 No. 8, Aug. 1978, pp 14-15, 2 Phot.

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179880
PAVEMENT OVERLAY: SAVINGS IN REDUCED MAINTENANCE
A non-woven reinforcing fabric was used recently in reconstructing a runway at Naples Municipal Airport. The non-woven polypropylene filter fabric provides a stress barrier that increases fatigue life of the pavement and reduces reflective cracking. After filling the cracks in the pavement, the surface was cleaned with a power broom and a tack coat of asphalt cement was applied. The fabric was overlapped with a 10-inch overlap and an extra tack coat was applied to bond overlapping layers of fabric. A course of bituminous asphalt was laid down after the fabric. A tack coat was then applied before the final course of a specially designed asphalt mix.

Airport Services Management Vol. 18 No. 8, Aug. 1978, pp 16-17

ACKNOWLEDGMENT: Airport Services Management

ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179881
GROOVING: NAFEC'S AIM IS TO CUT AIRPORT COSTS
This article describes a project that will evaluate new runway grooves patterns that could save airport operators and U.S. taxpayers millions of dollars in grooving and regrooving costs. This study will determine the lowest cost runway groove configuration which has acceptable performance. A test track was installed and the surface was grooved. Runway grooves spaced 2-1/2 inches apart with tolerances to 3 inches may provide acceptable braking for aircraft on wet runways. A jet-powered pusher car and dead load car are used to simulate landing speeds up to 150 knots and wheel loads up to 35,000 lb. per wheel. After the tests on the PCC surface has been completed, the PCC testbed will be replaced with an asphaltic concrete surface which will also be grooved and tested. Researchers also plan to test a new porous asphalt compound designed to provide rapid drainage, and a PCC surface in which grooves are made during curing instead of by post-cure cutting.

Airport Services Management Vol. 18 No. 8, Aug. 1978, pp 20-23

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179882
FLIGHT INFORMATION DISPLAY SYSTEMS: FACTORS FOR USE IN AIRPORT PLANNING
This article discusses several important factors that are not always recognized when planning Flight Information Display Systems (FIDS) installations. They are set forth in order to assist the planner in achieving a system that is integrated into the total facility, both architecturally and operationally. With respect to public display requirements, it is noted that an airline displays operating data to the public primarily to answer questions that would otherwise require manpower for that purpose. Displays should be strategically placed, easily read, and provide sufficiently complete and current information. It is important that display design be given due consideration with respect to size and shape, location with respect to passenger flows and location with respect to other displays. It is important to obtain maximum readability with respect to the alpha- numerics that makeup an information display. The latter style and spacing both contribute to the readability. FIDS is a necessary consideration in planning for an airport, for a terminal, and for an airline.

Van Dyke, KS, Jr *Airport Services Management* Vol. 18 No. 8, Aug. 1978, pp 24-26

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179883
FLIGHT INFORMATION DISPLAY SYSTEMS: A TOTAL FOR EFFECTIVE MANAGEMENT
This article notes that new airport design concepts have generated new airport management problems. Flight Information Display Systems (FIDS) have been shown to be an efficient instrument whose proper application can result in sharply improved internal distribution of information both to passengers and to operations personnel. The most significant FIDS installation is located at Dallas/Fort Worth Airport. Three FIDS are working as an integrated mode, the integration of these three systems operate a single powerful fully automated multiple input/output FIDS. It is noted that at present the system most sought after makes use of "Flap Type" display signs of a large variety of sizes and functions together with a multitude of video channels that can be used to repeat the information shown by signs or to show different types of information altogether. No airport, regardless of its size and complexity of operation is complete and fully efficient without a FIDS.

Airport Services Management Vol. 18 No. 8, Aug. 1978, pp 27-29

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

03 179884
MUSHROOM GROWTH IN THE MIDDLE EAST
Growth rates in passenger and cargo traffic to the Middle East are expected to average about 15% per year during the period to 1982. The Middle East has become a showcase for airport design and equipment choice. Although in most cases the region does not suffer the constraints of siting, land use, noise access, and community reaction, there are two issues which have yet to influence the region. First, the Middle East may be a high-fare market at present, but low fares and new marketing concepts are certain to spill over. Second, most developing countries believe that the air transport consumer should pay an economic rate for the facilities provided on their behalf. The busiest passenger route within the Arab world links Jeddah with Cairo. The airport developments at either end highlight the economic differences between Saudi-Arabia and Egypt. The major international airports and commercial centers of the region are discussed. Civil wars, the widespread military restrictions over much of the airspace in the Middle East, and the fighting in the Horn of Africa indicate that prosperity and growth ultimately depend on peace and stability.

Hofton, A *Airports International* No. 67, June 1978, p 12

ACKNOWLEDGMENT: Airports International
ORDER FROM: IPC Transport Press

03 180123
NOISE BURDENS AT BRITISH REGIONAL AIRPORTS
Estimates of the numbers of people annoyed by aircraft noise at 10 regional airports in August 1972 are compared with the figure for London (Heathrow). Despite a considerably smaller passenger traffic volume the 10 regional airports as a group are estimated to adversely affect as many people as does Heathrow suggesting that in terms of relative noise nuisance it may be better to concentrate traffic at a single large airport rather than to disperse it to a number of smaller ones. The noise burden factor concept (the number of man-days of serious noise annoyance per passenger movement) provides a means for comparing airport noise efficiencies. As well as quantifying the fact that Heathrow can be regarded as a better neighbor than some of the regional airports, calculations of this factor show that the noise problem in the U.K. is rather worse than that in the U.S.A., due primarily to higher population densities. It is estimated that in the U.K. as a whole, more than 1.5 million people near commercial airports are seriously annoyed by aircraft noise.

Deva-Aditya, NJ Hooper, RD Ollerhead, JB
Loughborough University of Technology, England TT-77-4, Mar. 1977, 32 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N77-29651)
ORDER FROM: NTIS

03 180130
NEW AIRPORT IN GOTHENBURG--HOW THE NOISE PROBLEMS HAVE BEEN HANDLED
Noise monitoring and abatement procedures instituted at a commercial airport capable of handling about 60,000 movements per year are described. The selection of a parallel runway instead of a crossed runway layout is discussed, and the stipulated entry heights of landing aircraft are considered. A noise monitoring system designed to provide noise level and flight path assessments for all aircraft using the airport is also mentioned. Maintenance of a 55-decibel flight noise limit is required at the airport.

Inter-Noise 77, Noise Control-The Engineers Responsibility; Proceedings of the Sixth International Conference, Zurich, Switzerland, March 1-3, 1977. (A78-12812 02-71).

Hall, T (Goteborgs Fororter, Arkitektkontoret, Sweden) Benjegard, SO (Ingemansson Acoustics, Sweden)
International Inst of Noise Control Engineering Proceeding 1977, p B627

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12822)
ORDER FROM: AIAA

A78-12822

03 180135
UNDER-APRON TRANSIT FOR ATLANTA TERMINAL
Expansion and passenger transit plans for the Hartsfield Atlanta International Airport are described. Construction on a terminal designed to

accommodate 55 million passengers a year has begun, and beneficial occcupancy of the building is anticipated in December 1980. Phase one will consist of 104 wide-body aircraft gates, which can eventually be increased to 130 gates. A fourth east-west parallel runway is planned. The airport transit system will normally operate as a continuous-loop system with 17 80-passenger rubber-tired vehicles in three car trains, although the system could convert to a shuttle system when necessary. Moving walkways are planned within the passenger mall. Concourses and the location of baggage handling facilities are also described.

Jacobsen, PS *Airports International* Oct. 1977, 4 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-15343)
ORDER FROM: AIAA

A78-15343

03 180142
A NEW APPROACH TO FUTURE AIRPORT PLANNING

The article provides a broad discussion of airport planning concerns with reference to statistics from various American, British, and French airports. The growth in air traffic during the past two decades is described in terms of french facilities. Consideration is given to the problem of access to airports, noting that airport design and operation must be integrated into other means of mass transportation.

Wefati, EM *Aviation Research Journal* Vol. 2 July 1977, pp 79-86

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-20482)
ORDER FROM: AIAA

A78-20482

03 180143
AIRPORT HYGIENE AND EPIDEMIOLOGY

Airport and aircraft hygiene is discussed in terms of suppiying food and drinking water, the removal of body wastes, cleaning sanitary facilities, and the disinfection and deinsectization of aircraft. Consideration is given to airport epidemiology, noting that the assembly of persons and freight from all parts of the world constitutes ideal conditions for the spread of diseases including smallpox, yellow fever, and cholera. [French]

Medecine Aeronautique et Spatiale (Aeroport de Paris, Orly-Aerogare, France) Vol. 16 1977, pp 104-107

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-20552)
ORDER FROM: AIAA

78-20552

03 180145
MORE PUBLIC CONSULTATION ON AIRPORT PLANS

This paper presents a critical review of airport planning over the last 20 years, stressing that the situation which has existed in the past, namely that almost every mid-size community wanted an airport, has changed in the sense that airports must now be considered within the framework of long range environmental planning. Thus, airport planning can no longer be internalized, i.e., concerned only with the requirements of air traffic in its vicinity. Instead, air transport must be integrated into a total system of transportation, with attention to the health of the environment and the quality of life in the community it serves. [German]

Michaels, LP *Airport Forum* Vol. 8 Feb. 1978, 3 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-29208)
ORDER FROM: AIAA

A78-29208

03 180148
LOOKING OFFSHORE AT THE AIRPORT FUTURE

Increases in the volume of air traffic is expected to present a critical problem for U.S. and world airports during the 1980s. Solving the problem of the trailing vortex behind aircraft, together with the Microwave Landing System (MLS), should ease the crunch somewhat. New airports, however, will still be needed. This paper discusses the feasibility of locating airports off-shore, with attention to cost and population density factors. The Honolulu International Airport is presented as an example of an operational off-shore facility. Off-shore airports in Hong Kong, using land fill from excavations; and for Cleveland, using land reclaimed from Lake Erie by a polder (DIKE), are considered for the near future.

Lord, CJ (Parsons (Ralph M) Company) *Astronautics and Aeronautics* Vol. 16 Apr. 1978, pp 45-49

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-30245)
ORDER FROM: AIAA

A78-30245

03 180149
INTERNATIONAL TRENDS IN AIRPORT CONSTRUCTION

Air transport, in terms of passengers per year, is growing at a prodigious rate, and can now be considered an element of mass-transit in general. Thus, airports planned for today must reckon with greatly increased traffic by the time they are completed. This study emphasizes flexibility of design, especially in relation to facilities for handling aircraft ground traffic, and for improving the connections between airports and adjacent cities in order to avoid passenger congestion at the terminals. The Aeroport Charles de Gaulle and the Leningrad Airport are presented as illustrations. [German]

Haas, E (Gesellschaft f International Flugverkehr MBH E Ger) Schmelzer, D *Technisch-Okonomische Inf de Zivilen Luftfahrt* Vol. 13 No. 6, 1977, pp 313-323

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-32814)
ORDER FROM: AIAA

A78-32814

03 180150
THE AIRPORT CITY AND THE FUTURE INTERMODAL TRANSPORTATION SYSTEM BOOK

The connection between city development and the prevalent mode of transportation is considered for the various periods of transportation development, taking into account also the present time transportation development, taking into account also the present time in which air transportation has become a very important factor. A planner looking for a suitable industrial site might find an appropriate location in a cargo center which provides maximum economy in transferring goods and materials between truck, rail, air, and ship. It is concluded that a new era in transportation is beginning. The system of the future will offer new intermodal and transmodal features. The emerging new concept of planning is examined in detail, giving special attention to the role of general aviation. Attention is given to market factors for airport projects, design factors for airport projecs, office and industrial parks, cargo and distribution facilities, travel facilities, resorts, attractions, planned airport communities, jetport cities and metro complexes, a geographical index of reported projects, and a checklist of factors for planning large-scale developments.

Conway, HM
Conway Publications, Incorporated 1977, 336 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-34724)
ORDER FROM: AIAA

A78-34724

03 180153
NAIROBI'S FUTURE HAS BEGUN--KENYA INTERNATIONAL AIRPORT FACILITIES

The opening of a new passenger terminal at Nairobi International Airport, Kenya in 1978 marked an important step in the development plans for an airport rated by ICAO studies as the leading flight-processing center for Africa. The circular terminal was designed to handle approximately 3 million passengers per year; a 50-m high air traffic control tower was also included in the design. Mobile airbridges, an approach lighting system and a freight-handling facility were also installed. [German]

Davies, V (Ministry of Power & Communications, Kenya) *Airport Forum* Vol. 8 Apr. 1978, 9 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-35275)
ORDER FROM: AIAA

A78-35275

03 180155
FLIGHT SERVICE SYSTEM MODERNIZATION PROGRAM
The paper describes the current flight service station network, how it developed, and the services it provides. Problems associated with the current facilities are discussed and a proposed FAA three-phase modernization program is presented. This program emphasizes automation for the specialist, consolidation of present flight service stations, and utilization of unique communications devices; e.g. pilot self-briefing terminals and automatic voice response systems, as the key features in a new national automated system.

NAECON '76; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, 18-20 May 1976. (A77-37352 17-33)

Roche, RJ Glassburn, GL (Federal Aviation Administration)
Institute of Electrical and Electronics Engineers Proceeding 1976, pp 820-824

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-37456)
ORDER FROM: AIAA

A77-37456

03 180158
AIRPORTS AND THEIR TERRITORIAL INTEGRATION
The effects of airports on the region in which they are located are considered. In the case of airports with more than 2000 m length a considerable area of the region is directly occupied by the territory of the airport. There are, in addition, restrictions concerning the utilization of the land in the environment of the airport. The safe conduction of the flight operations makes it necessary to observe in the airport neighborhood regulations involving considerable restrictions regarding the establishment of buildings and other objects which could constitute obstacles to the air traffic. Aircraft noise prevents the operation of hospitals, homes for the elderly, and schools in parts of the airport environment. [German]

Harzbecker, E *Technisch-Okonomische Inf de Zivilen Luftfahrt* Vol. 13 No. 1, 1977, pp 36-39

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-39447)
ORDER FROM: AIAA

A77-39447

03 180169
RIO'S AIRPORT FUTURE HAS BEGUN--TERMINAL DESIGN FEATURES
A description is presented of the Rio de Janeiro International Airport in Brazil. The first terminal of the airport opened to traffic in the Spring of 1977. Three more terminals are to be ready by 1990. The design of the airport is to assure a rapid, safe, and economical transfer of passengers and cargo between aircraft and ground transport. Attention is given to the runway and apron area, the passenger terminal area, the administrative building, the control tower, the roadway system, the parking areas, the industrial area, the support area, the mechanical installations, air navigation and landing aids, the power supply, lighting systems and visual landing aids, the emergency electrical system, software, and aspects related to the construction of the airport.

Maksoud, H (Engenharia de Projetos, Ltda, Brazil) *Airport Forum* Vol. 7 June 1977, p 13

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41376)
ORDER FROM: AIAA

A77-41376

03 180171
ISTANBUL'S PLANNED FUTURE--AIRPORT FACILITIES
The present Istanbul International Airport, named Yesilkoy, is located at a distance of about 20 km from the town center. The airport serves international as well as domestic air traffic. The facilities of the airport are to be extended according to a master plan to allow for an ultimate traffic volume of roughly 25 million passengers a year. Terminal unit I, now under construction, is scheduled to be operational in 1980. Attention is given to design details regarding the new terminal and the terminal building unit, the aircraft stands, passenger departures and arrivals, air conditioning and ventilation, the electrical systems, and aircraft facilities.

Tabanlioglu, H (Ministry of Public Works, Turkey) *Airport Forum* Vol. 7 June 1977, pp 43

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41378)
ORDER FROM: AIAA

A77-41378

03 180172
COST-BENEFIT ANALYSIS FOR AIRPORT DEVELOPMENT
Prime initial requirements for cost-benefit studies include a measurement of all the factors which are relevant to costs and revenue that are likely to arise from a project and its development. It is generally necessary to estimate the costs and benefits under a series of alternative conditions. Attention is given to the secondary effects from airport development, the setting up of the study program, questions of cost estimation, the types of revenues, and the final analysis of cost-benefit relations.

Stratford, AH (Stratford (Alan) and Associates, Limited) *Airport Forum* Vol. 7 June 1977, p 59

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41379)
ORDER FROM: AIAA

A77-41379

03 180173
SERVICES AND INSTALLATIONS FOR AVIATION AT AIRPORTS AND AIRFIELDS OF REGIONAL IMPORTANCE--GERMAN BOOK
The reported investigation is to provide an evaluation criterion concerning the future characteristics of the services and installations for the considered airports in the Federal Republic of Germany. An evaluation scheme for the determination of the requirement threshold for services and installations for aviation is discussed, taking into account flight-operational aspects, the air traffic control service, the flight information service, the communications service, the navigation service, the weather service, aspects of air space supervision, and details regarding the evaluation scheme. Attention is given to lighting systems, visual aids, instrument landing system installations, and VOR installations. [German]

Deutsche Gesellschaft fuer Ortung & Navigation 1977, 83 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41462)
ORDER FROM: AIAA

A77-41642

03 180174
THE LAND USE PROBLEM IN THE AIRPORT ENVIRONMENT--AND SOME SUGGESTED SOLUTIONS
Approaches for attacking the noise problem in the vicinity of airports are considered. One approach is concerned with reduction of noise in the aircraft. The high by-pass engine of the present generation of wide-bodied aircraft is an example of the efficacy of this technique. A second approach is related to the use of operational procedures which will minimize noise exposure for the public. The third approach involves a control of the use of the land in the airport environment to ensure that it is compatible with the use of the airport. Particular attention is given to the various factors and difficulties regarding an implementation of the third approach and the possibilities to overcome these difficulties.

From The Place of Aviation in Society; Proceedings of the 15th Anglo-American Aeronautical Conference, London, England, 31 May-2 June 1977 (A77-41926 19-03).

Pyle, JT
Royal Aeronautical Society Proceeding 1977, 16 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41932)
ORDER FROM: AIAA

A77-41932

03 180179
AIRPORT NOISE--A MONITORING PROGRAM AND THE FIRST STEPS TOWARD ITS SOLUTION
Difficulties in defining subjectively tolerable noise level criteria relevant to airport noise and community noise are discussed, and the applicability of such criteria to noise in general is considered. A noise monitoring program involving the distribution of ruggedized low-cost environmental noise monitors to some 350 families in the airport vicinity enlisted in the program

is described. Lower noise levels from one airline were found to reflect consistent and rigorous adherence to recommended procedures, with further benefits in safety and lower fuel costs.

Presented at an ASA Meeting, San Diego, California, 16-19 November 1976.

Perez, AE (Minnesota Pollution Control Agency)
Acoustical Society of America Proceeding 1976, 7 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-44458)
ORDER FROM: AIAA

A77-44458

03 180182
EDINBURGH--A NEW TERMINAL FOR SCOTLAND. AIRPORT TERMINAL DESIGN

The Edinburgh, Scotland airport terminal opened in May, 1977 is described. The terminal design, encompassing a floor plan of about 14,500 square meters, is intended to accommodate a heavily-traveled domestic route, from Edinburgh to London, as well as growing international traffic. Patterns of passenger and baggage movement within the terminal are considered; the flexible structure of the building, which was designed to permit future alterations of the airfield and adaptation of the internal space to various services, is also discussed.

Colam, EK *Airport Forum* Vol. 7 Aug. 1977, p 19

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-47978)
ORDER FROM: AIAA

A77-47978

03 180183
REDUCING WALKING DISTANCES AT EXISTING AIRPORTS

Appropriate gate allocation to shorten walking distances for passengers at airport terminals is proposed, with the emphasis on making the most effective use of existing facilities. An analysis of gate allocation procedures at a terminal of the Toronto, Canada International Airport over a period of several years was performed; various categories of passenger flow, such as arriving, departing, domestic, foreign and transferring were studied. It was found that the average walking distance for passengers could be reduced by as much as 57% through effective management of gate scheduling. Maximum walking distances established by the reference manual of the International Air Transport Association are also discussed.

Braaksma, JP (Carleton University, Canada) *Airport Forum* Vol. 7 Aug. 1977, p 135

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-47980)
ORDER FROM: AIAA

A77-47980

03 180195
MODEL OF AIRPORT EMPLOYEE ACCESS TRAFFIC

Previous research on airport access has not focused adequate attention on airport employee traffic considering that airports employ nearly one person per daily enplaned passenger. This paper provides a tool that can be used to estimate employee traffic volumes in specified time intervals as a function of employee work shift characteristics. Inputs to the model include work-shift times, the number of employees per shift, probability distributions for the times at which employees actually arrive at and leave work, and the average number of employees per vehicle. The model is designed for use in conjunction with models of air passenger and visitor traffic. In particular, it can be used to investigate the potential for mutual interference of employee traffic peak and air passenger traffic peaks. A demonstration of the model is presented using data collected at the Dallas/Fort Worth Regional Airport; model estimates are compared with actual traffic counts of employee vehicles.

Dunlay, WJ, Jr (Pennsylvania University, Philadelphia) *ASCE Journal of Transportation Engineering* Vol. 104 No. 3, May 1978, pp 349-361, 5 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 180196
PEDESTRIAN SUBWAYS AT HEATHROW

An outline of the ground engineering involved in the construction of subways at Heathrow in the United Kingdom while keeping disruption to a minimum is presented.

Crundwell, VC (Mouchel (LG) and Partners) *Consulting Engineer* Vol. 42 No. 1, Jan. 1978, p 18

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 180197
PLANNING AND DESIGN OF SMALL AIRPORTS IN CANADA

Small terrestrial airports have been found to be essential and indispensable for provision of personnel, fresh foods, and relatively small lightweight construction supplies for remote major projects within Canada. There has also been an increasing interest expressed by officials and professionals of the writer's acquaintance in recognizing an increasing need of inhabitants of these remote areas for air transportation. Though of far less complexity than large air transport facilities, certain principles of planning and design are considered as indispensable in the successful completion of even the least sophisticated facility. A brief summary of a planning procedure for the fulfillment of these technological requirements is described.

Hubley, DG (Saint Mary's University, Nova Scotia) *ASCE Journal of Transportation Engineering* Vol. 104 No. 3, May 1978, pp 373-377, 1 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

03 180431
KINGDOM OF TONGA FUO'AMOTU AIRPORT; REPORT ON AIRPORT DEVELOPMENT (WITH SUPPLEMENTARY REPORT)

The Government of Tonga requested Australian advice on the future development of Fua'amotu airport in November, 1976. The Australian Development Assistance Bureau arranged for a coordinated study to be carried out by two Australian government departments: Department of Construction and Department of Transport. The terms of reference for the study required an engineering evaluation of the existing aircraft pavements, review of existing airport facilities; preparation of a master plan, and recommendations on the staged development with associated costs identifying specific airport development stages for the short, medium and long term. The site investigation and testing associated with this study were carried out during the period 23 May to 30 June, 1977. The supplementary report covers the design of bituminous concrete and the existing runway riding quality. The report is confidential. (A)

Australian Development Assistance Bureau Monograph Aug. 1977, n.p., Figs., Tabs., 16 Phot., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234075), Australian Road Research Board
ORDER FROM: Australian Development Assistance Bureau, Hobart Place, Canberra, A.C.T., Australia

03 180433
THE CAPACITY OF AIRPORT RUNWAYS [Capacita delle piste d'atterraggio in un'area aeroportuale]

It is pointed out that airport capacity and facilities have not kept up with the ever increasing demand for air transport, largely due to lack of space, environmental problems, and difficulties of land acquisition. These conditions impose the necessity for the maximum use of existing airport space in the improvement of facilities and planning for future traffic. Some analytical models are proposed for quantifying the concept of runway capacity in single (landing or take off) and mixed (landing and take off) operation. Delay and saturation factors affecting this capacity are analysed, and the mathematical models are exemplified by application to real operation data. [Italian]

Dalio, LG Iacopino, G (Politecnico di Torino) *Rivista della Strada* Vol. 47 No. 439, Feb. 1978, pp 173-183, 14 Fig., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233278)
ORDER FROM: Casa Editrice la Fiaccola, Via Ravizza 62, Milan, Italy

03 180486
EXPANSION OF FLIGHT SIMULATOR CAPABILITY FOR STUDY AND SOLUTION OF AIRCRAFT DIRECTIONAL CONTROL PROBLEMS ON RUNWAYS
The development, evaluation, and evaluation results of a DC-9-10 runway directional control simulator are described. An existing wide bodied flight simulator was modified to this aircraft configuration. The simulator was structured to use either two of antiskid simulations; (1) an analog mechanization that used aircraft hardware; or (2) a digital software simulation. After the simulation was developed it was evaluated by 14 pilots who made 818 simulated flights. These evaluations involved landings, rejected takeoffs, and various ground maneuvers. Qualitatively most pilots evaluated the simulator as realistic with good potential especially for pilot training for adverse runway conditions.

Kibbee, GW
Douglas Aircraft Company, Incorporated Final Rpt. NASA-CR-2970, Apr. 1978, 106 pp

Contract NAS1-13981

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-20118/3ST

03 180547
AIRPORT DEVELOPMENT: SOCIAL AND ECONOMIC EFFECTS (A BIBLIOGRAPHY WITH ABSTRACTS)
The reports cited in this bibliography involve many phases of airport development relating to local regions and communities. They include physical design, planning, construction, operations, policies, and impacts. Studies of feasibility, conversion-utilization of military facilities, economic impact, public attitudes, and cost effectiveness are included. Municipal and rural relations, political issues, controversies, and technical assistance programs are described. (This updated bibliography contains 61 abstracts, 21 of which are new entries to the previous edition.)

Supercedes NTIS/PS-77/0441/4ST, a previous bibliography covering the period 1968 to April 1977.

Kenton, E
National Technical Information Service May 1978, 66 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-78/0447/9ST

03 180630
BENEFIT-COST EVALUATION OF AN INTRA-REGIONAL AIR SERVICE IN THE BAY AREA
Utilization of an iterative statistical model is presented to evaluate combinations of commuter airport sites and surface transportation facilities in conjunction with service by a given commuter aircraft type in light of Bay Area regional growth alternatives and peak and off-peak regional travel patterns. The model evaluates such transportation options with respect to criteria of airline profitability, public acceptance, and public and private nonuser costs. It incorporates information modal split, peak and off-peak use of the air commuter fleet, terminal and airport cost, development costs and uses of land in proximity to the airport sites, regional population shifts, and induced zonal shifts in travel demand. The model is multimodal in its analytical capability, and performs exhaustive sensitivity analysis.

Haefner, LE
Washington University, St Louis Tech Rpt. NASA-CR-152084, Dec. 1977, 285 pp

Grant NSG-2170

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-19082/4ST

03 180676
AN AIR PASSENGER AND AIR FREIGHT SERVICE STUDY FOR THE LAKE CHARLES MUNICIPAL AIRPORT AUTHORITY
An Area's overall air traffic varies accordingly to many variables; industry, population, highway conditions, proximity to major city, etc. It has been concluded that the overall air traffic that is provided to the Lake Charles area by the regional air line, Texas International and the commuter airline, Royal, is good. This conclusion has been established by talking with different travel agencies, industry, businessmen, comparing flight schedules with other cities and talking to the individual airlines. A major topic in this study is the return flights from Houston and New Orleans. It is recommended that the different air lines talk to the U.S. Postal Service in Lake Charles to see if some of the mail can again be sent by air as it was a few years back. Tie down should be provided for private planes at the airport and also secure the hangers at Chenault for emergency use. If a new commuter line is allowed in Lake Charles, the airport authority should check into the financial stability of the commuter airline.

Prepared in cooperation with League of Cities-Conference of Mayors, Inc., Washington, D.C. Contract HUD-H-2196R.

Young, JC Owen, CK
Lake Charles-McNesse Urban Observatory, Department of Housing and Urban Development Final Rpt. UO-LCCN-LAC-77-017, HUD/RES-1305, Dec. 1977, 38 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-278857/8ST

03 180735
NONDESTRUCTIVE PAVEMENT EVALUATION
Research has been in progress for about 10 years to develop a compatible pavement evaluation procedure for airfields based on nondestructive tests. A successful nondestructive pavement evaluation technique will reduce the time of closure of various airfield facilities needed to conduct destructive tests required for conventional pavement evaluation. This study provides a comparison of the projected pavement life of several airfield features estimated by nondestructive and destructive pavement evaluation procedures. For aircraft and gross loads on similar pavement sections, the nondestructive evaluation procedure yields higher numbers of allowable operations as compared to that obtained by the destructive test evaluation technique at this point in the research effort. Follow-on research is planned which will cause the two evaluation procedures to yield more closely compatible numbers. (Author)

Das, BM
Air Force Civil & Environ Engineering Dev Office, (2054) Final Rpt. CEEDO-TR-77-41, Oct. 1977, 22 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052707/7ST

03 180759
AIRPORT SURFACE DETECTION EQUIPMENT (ASDE-3) PROJECT PLAN [Rept. for FY 1978-1979]
The Airport Surface Detection Equipment (ASDE) is a primary radar and display system used to provide the airport surface traffic situation to the air traffic controller. An ASDE-3 engineering model is being procured by the Transportation Systems Center (TSC) for testing at NAFEC. The product of this development will be a complete and comprehensive technical data package presented to the Airways Facilities Service (AAF) for procurement of production ASDE-3 units. The purpose of this Project Plan is to describe the program for development, test, evaluation, maintenance, and configuration control of the ASDE-3 engineering model, and to delineate the responsibilities of each of the participating organizations. (Author)

Perie, ME
Federal Aviation Administration FAA-RD-78-12, Jan. 1978, 49 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052362/1ST

03 242731
PLANNING FOR SATELLITE AIRPORTS
THIS STUDY EXAMINES THE POTENTIAL ROLE OF SATELLITE AIRPORTS AND ATTEMPTS TO DEFINE THE FACTORS DETERMINING THE DISTRIBUTION OF SERVICE AND DEMAND AMONG AIRPORTS SERVING THE SAME METROPOLITAN AREA. THE ANALYSIS INDICATES THAT AS A NATURAL RESULT OF THE COMPETITION FOR MARKET SHARE, AIRLINES ARE IMPELLED TO CONCENTRATE THEIR OPERATIONS, TO THE EXTENT PERMITTED BY THE PREVAILING REGULATORY PROCESS, AT AN INDIVIDUAL AIRPORT WHILE SERVING A GIVEN MARKET. THESE RESULTS ARE DERIVED BY

ANALYZING THE IMPLICATIONS OF OBSERVED PATTERNS OF TRAVELLER BEHAVIOR ON THE STRATEGY OF AN INDIVIDUAL AIRLINE WITHIN A GIVEN AIRPORT, AND THEN EXTENDING THIS ARGUMENT TO THE GENERAL COMPETITIVE GAME INVOLVING SEVERAL AIRPORTS AND SEVERAL AIRLINES. THE RESULTS IMPLY THAT ANY STRATEGY SEEKING TO DEVELOP SATELLITE AIRPORT WILL INHERENTLY BE FRUSTRATED UNLESS THE COMPETITIVE BEHAVIOR OF THE AIRLINES IS DELIBERATELY ALTERED. /ASCE/

Gelerman, W De Neufville, RL *ASCE Journal of Transportation Engineering* Vol. 99 No. TE3, Aug. 1973, pp 537-52, 11 Fig., 1 Tab., 8 Ref.

ORDER FROM: ESL

04 144087
CONFERENCE PAPERS ON ADVANCE FREIGHT SYSTEM TECHNOLOGY: "AMERICA'S" FREIGHT SYSTEM IN THE 80'S AND 90'S...BUT HOW TO GET THERE?"

These papers relating to technology and freight transportation have been prepared for the conference on America's Freight System in the 80's and 90's. It does not purport to be a compendium on all advanced freight technology but is to give an overview of problems and possibilities. The chapters: Forces of Change in Transportation; Testimony before the Subcommittee on Aviation and Transportation R&D; Intercity Transportation- Air Freight Transportation; A View of Air Freight Developments in the Next Decade; Software Technology and the Quantum Leap; Cargo Aircraft Technology in the Context of Economics; TRAILS--A New Concept in Freight and Passenger Transport; Outlook for Pneumatic Pipelines; International Steam Coal: The New Energy Competitor; Research Opportunities for Railroad Information Systems, 1975-1990; Rail Terminal Information Systems; Southern Pacific's Car Activity System (CAS); The Future Trends in Railroad Motive Power in the United States; Air Cushion Technology Contributions to America's Future Freight Systems; Federal Highway Administration Research Effort for Assessing the Economic and Safety Implications of Increased Truck Size and Weight Limits.

Presented at a Conference sponsored by the US Department of Transportation, Transportation Systems Center, Cambridge, Massachusetts, December 1-2, 1976. See also individual papers, RRIS 11 157946 and 20 157947, 7702.

Harbridge House, Incorporated, Transportation Systems Center DOT-TSC-0ST-77-S, Dec. 1976, 244 pp, Figs., Tabs.

Contract DOT-TSC-1276

ACKNOWLEDGMENT: TSC, NTIS
ORDER FROM: NTIS

PB-262943/4ST

04 145439
INTERPORT. BASIC PROPOSALS FOR A MODERN FREIGHT SYSTEM IN INTERMODAL CONTAINERS [Interporto. Infrastruttura fondamentale per un moderno sistema merci in contenitori intermodali]

In this article a policy is proposed, where 9 established centres (called "interports") throughout Italy, would interconnect all transport systems, air, rail, road and sea, and improve the handling and distribution of container freight. The 9 centres suggested (Genoa, Pisa, Cagliari, Naples, Catania, Bari, Ancona, Venice and Trieste) have been chosen because they already contain airports, ports, and well developed road systems which serve them. Thus any further development necessary to the "interport" service would be minimal. Tables and graphs analyse the modal distribution and costs of all types of freight carriage in Italy, and some solutions for the layout of "interports" are illustrated. It is argued that with the proposed system in operation, Italy, from its geographic position, could become an important distribution centre for the mediterranean and Europe, and handle a large portion of traffic to and from the Middle and Far East, and West Africa. /TRRL/ [Italian]

Roma, G *Automobilismo E Automobilismo Industriale* Vol. 24 No. 5-6, 1976, pp 231-266, 24 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-222962)
ORDER FROM: Automobile Club of Italy, Via Marsala 8, 00185 Rome, Italy

04 157200
EVALUATED DATA BASE FOR MARYLAND FREIGHT TRANSPORTATION PLANNING

The results are presented of a study to collect and evaluate freight transportation data on motor carrier, railroad, airline, water, pipeline and other goods movement modes. Problems encountered in acquiring this data are, noted, and sources of the existing data are listed. It is noted that on a tonnage basis, by all major modes except trucking, Maryland is a net importer of goods. Tonnages moved both into and out of the state by the five major modes. About 158 million tons of freight were transported to or from Maryland in 1973. The goods had an estimated value of more than $21 billion. It is suggested that an approach to augmenting and improving upon the existing commodity flow data base of Maryland Might be to concentrate on the modal funcition points and major population centers, and perform analyses of vehicle trips and tonnage flows from a terminal. The anlayses should consider destination by region outside the state and within the state; regional rankings could be calculated by tonnage and vehicle movements; and statistics could be created by commodites carried and vehicle loadings.

This report was prepared for the Maryland Department of Transportation.

Taff, CA Thieblot, AJ, Jr McGee, MP
Maryland University, College Park 1975, 93 pp, Figs., Tabs., Refs., 1 App.

04 157703
ENERGY AND ECONOMIC IMPACTS OF PROJECTED FREIGHT TRANSPORTATION IMPROVEMENTS

This study examines current and future energy impacts for each major freight mode, by commodity, and, in many cases, by vehicle types. It also discusses potential economic impacts of these anticipated changes. The study is limited to intercity freight movements of both private and for-hire carriers. The study includes a determination of base case energy scenarios for 1972, 1980, and 1985 to serve as a basis for evaluating operational and technological impacts by 1980 and 1985 for an industry change scenario (in which industry is likely to implement changes on its own), and the government influence scenario (where changes could be accelerated by changes in economic and regulatory policies). Much of the data and findings contained in this study represent original research, but based on a relatively incomplete national data base. The report discusses in detail operational and technological changes which will have energy and economic impacts on each of the freight modes included in the report. Greater emphasis was given to intercity freight transportation by truck and railroad, with less emphasis on inland, coastal, and great lakes movements, pipelines and air freight.

Sponsored by the Office of the Secretary, U.S. DOT, through the DOT's Transportation Systems Center.

Leilich, RH Cohen, RD Green, A Kendrick, MJ
Peat, Marwick, Mitchell and Company Final Rpt. DOT-TSC-OST-76-61, May 1977, 448 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-260000/5ST

04 163703
AN ASSESSMENT OF THE RISK OF TRANSPORTING PLUTONIUM DIOXIDE BY CARGO AIRCRAFT

This report is the third in a series of reports evaluating the risk of transporting plutonium by various modes. For comparative purposes, all shipping evaluations use the same bases. The characteristics of the nuclear economy used in this analysis are: a total of 18 metric tons of plutonium is shipped annually via the mode; 100 kg of plutonium are transported per shipment (for air shipment a truck and air segment are considered); shipping systems and regulations; and plutonium dioxide (PuO2) is shipped in 6M (15-gal) containers. Only aircraft shipments of plutonium diozide powder were considered. Based on shipping assumptions, the likelihood that an aircraft carrying shipment will be involved in an accident is estimated to be about once in 450 years. Graphs showing risk spectra for plutonium shipments are presented. The comparison of truck and air transport modes for the same material showed truck transport to have less risk.

McSweeney, TI Johnson, JF
Battelle Memorial Institute/Pacific Northwest Labs BNWL-2030 UC-71, June 1977, 170 pp, 24 Fig., 40 Tab., Refs., 2 App.

Contract EY-76-C-06-1830

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

BNWL-2030

04 170844
A PLANNING MODEL FOR INTERNATIONAL AIR FREIGHT

Economic and social constraints upon airport expansion mean that planners must examine new means of expanding the existing facilities. To do this, it is necessary to isolate the domestic side of foreign air cargo operations. The authors describe a study of New York Airport to see how much domestic activity is generated by foreign air cargo volumes. The model offers planners a means of estimating the impact of new airport programmes and the impact of new construction on the cargo handling capacity.

Gilbert, J (Port Authority of New York and New Jersey) Sun, N Bunamo, M *Logistics and Transportation Review* Vol. 11 No. 2, 1975, pp 165-175, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: British Columbia University, Canada, Vancouver V6T 1W5, Canada

04 170846
AIR FREIGHT: OPERATIONS, ECONOMICS AND MARKETING
Air freight is now considered as the main source of revenues for aviation. The author analyzes the problems and nature of civilian air freight. After an introductory chapter on the development of air freight, he studies the air freight market and proposes distribution models. The last chapters concern the questions of costs, prices, and tariffs and cover the necessary coordinates of the air freight industry.

Faber and Faber Limited 1974, 434 pp, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Faber and Faber Limited, 3 Queen Square, London, England

04 170847
AIRFREIGHT TO AND FROM FLESLAND AIRPORT [Flyfrakt over Flesland Flyplass]
The report describes the results from an assessment of samples for the airfreight to and from Flesland Airport, Norway. The airfreight is analysed with regard to geographical distribution and characteristics of the transported goods. A survey of the development in airfreight internationally and within Norway is given. [Norwegian]

Brigtsen, H
Transportoekonomisk Institutt May 1975, 99 pp, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

04 170860
THE FUTURE OF THE U.S. DOMESTIC AIR FREIGHT INDUSTRY, AN ANALYSIS OF MANAGEMENT STRATEGIES
This study is on the freight transportation industry in the United States and the principal freight transportation companies for the period 1965-69, especially their management problems. It covers also forecasting for years 1970-80.

Schneider, L
Harvard University 1973, 217 pp, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Harvard University, Harvard Business School, Division of Research, Boston, Massachusetts., 02163

04 172782
JAPAN AIR LINES' COMPUTER APPLICATION IN THE OPERATIONAL AND MAINTENANCE FUNCTIONS
The application of large scale computers to several functions at Japan Air Lines is described. Passenger reservations, flight operations, maintenance and freight traffic systems are reviewed.

Ohtsuka, S (Japan Air Lines) *Shell Aviation News* No. 438, 1976, pp 8-15

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 172798
PROMISE OF AIR CARGO--SYSTEM ASPECTS AND VEHICLE DESIGN
A review of the current operation of the air cargo system and a discussion of the prospects for the future indicate that if technological innovations can be brought to maturity and implemented, and if the efficiency of the interface with the surface mode can be improved, the air mode would show an uprecedented growth. Air cargo demand is forecasted to increase in a dynamic manner. Estimates vary between 11-16%/yr between now and the 1990s. These forecasts conservatively indicate a fourfold increase in air cargo traffic between 1975 and 1985. Specialized, advanced terminals will be required to support the air cargo system of the future. Intermodal containers, automated handling systems, and computerized control and billing may be key ingredients. NASA and industry studies indicate that large gains in aircraft payload and fuel efficiency are possible from the application of advanced technologies and configuration concepts. Recent results have indicated that for containerized payloads exceeding about 0.3 Gg (600,000 lb), the span-distributed-load concept provides savings in operating costs over advanced fuselage-loaded designs.

Whitehead, AH, Jr (Langley Research Center) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 77-99, 23 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 172815
CHALLENGE FOR IMPROVED AIR CARGO CAPABILITY
The demands for large cargo airlift to the year 2000 are examined. The near and mid-term military needs require a substantial airlift improvement program. Mid-term emphasis must be for efficient, new civil capacity that can meet military emergency needs. The size of the air cargo business appears to still dictate use of a passenger derivative aircraft in this time period--rather than a dedicated air freighter. Military airlift commonality problems of loading heavy, outsize equipment must be resolved during the new aircraft design. The far-term airlift needs are for greater worldwide capability, which requires new technology and possibly a new aircraft configuration.
Prepared for SAE Meeting, 29 November-2 December 1976.

Vaughan, J (NASA Military Aircraft Systems Office)
Society of Automotive Engineers Preprint SAE 760883, 1976, 23 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 173831
THE COMPLEX AND CONFUSING AIR CARGO BUSINESS NEEDS AIRPORT PARTNERS
Most of the air carriers, forwarders, truckers, and customs clearance brokers cannot seem to get enough space on or off the airport to accommodate their respective businesses. The international airport cargo space situation is different than domestic in that import and export customs regulations often dictate the methods of handling cargo. There is a limited amount of on-airport cargo space where one can get customs supervision to operate a bonded warehouse that will handle inbound, or international intransit bonded shipments. Off-airport real estate handling export traffic not requiring customs bonds is commanding high land prices, for building, leasing or sub-leasing. Local airport authorities may lease land however, the carrier must build its own warehouse and at the end of the ground leasing time, the warehouse ownership reverts back to the airport authority. Many businesses are dependent upon being close to the carriers as their service businesses are "time sensitive" and therefore pay the high prices. It is noted that Federal Express has successfully entered the air freight industry by providing their own pickup and delivery and insuring next-day, overnight service. At present only a handful of airports in the U.S. are directly involved with their own air cargo development plan. It is noted that each state needs to create an air cargo post to assist the municipal airport authorities in planning air cargo strategy at the local, state and federal levels.

Cook, JC (Air Cargo Research) *Airport Management Journal* Vol. 3 No. 1, Apr. 1978, pp 16-19

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

04 173946
FREIGHT DATA REQUIREMENTS FOR STATEWIDE TRANSPORTATION SYSTEMS PLANNING--USER'S MANUAL
The purpose of this research report is to identify and rank data essential to state freight transportation planning and build a sound data base that will be useful to those engaged in such planning at the state level. The research approach consisted of identifying the principal problems/issues facing states, and deducing the types of state-level planning activities needed to deal with these problems/issues and their corresponding data requirements. Available planning methods and their data requirements were identified, available secondary data sets were catalogued, and the unmet data needs were critically assessed and alternative strategies were proposed to improve the data supply. The major freight problems/issues identified indicate that the greatest data need was for physical and operating data, especially information on facility location, operation characteristics, use, and capacity. There is a strong need for information on vehicle flow and on plant condition and unit costs, both capital and operating. Data supporting impact estimation are of moderate importance, especially data relating transportation system change to public health and safety. Four kinds of planning activities were examined in detail. Demand forecasting, modal choice analysis, economic evaluation, and impact estimation. The examination was for three purposes: To identify the likely planning activities by stage, determine data requirements, and assess the current state of the art.

Substantial resources were found that could be used for freight statewide transportation systems planning. The data sources are catalogued to aid the state planners in locating and obtaining suitable data as required for freight planning. The most important unmet data needs were found to be commodity flow and traffic flow data, routing data, rates/tariffs data, transport level-of-service data, and unit cost data. Strategies for improving the quality and quantity of the data include assembling similar data sets, publishing and disseminating data, establish close working relationships with carriers, and expand the census of transportation.

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

NCHRP Report No. 178, 1977, 155 pp, Figs., Tabs., 3 App.

ACKNOWLEDGMENT: TRB
ORDER FROM: TRB Publications Off

04 173947
FREIGHT DATA REQUIREMENTS FOR STATEWIDE TRANSPORTATION SYSTEMS PLANNING--RESEARCH REPORT

This report presents research findings, interpretations and conclusions. The report is aimed at those responsible for managing or supervising over-all statewide freight transportation systems planning. It presents the data needed for freight transportation in summary form. The appendicies present detailed information required by technicians and others practicing in the field. Chapter one summarizes the problem that led to the research, the defined objectives and scope, and the specific approach used in undertaking the research work. Chapter two presents the research results. Chapter three discusses the findings in light of the current state of the art at the state level. Chapter four presents the recommended strategies for improving freight data which should be carried out at the federal and state levels. Appendicies A through H present the research done in identifying freight data needs.

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

NCHRP Report No. 177, 1977, 190 pp, Figs., Tabs., 8 App.

ACKNOWLEDGMENT: TRB
ORDER FROM: TRB Publications Off

04 174312
APPRECIATION OF THE DYNAMIC PROBLEMS ASSOCIATED WITH THE EXTERNAL TRANSPORTATION OF LOADS FROM A HELICOPTER--STATE OF THE ART

Extensive wind tunnel and full-scale trials have indicated the serious speed limitations imposed by most loads when underslung from a helicopter on a single point suspension. Furthermore, the stability of each load must be judged on its own merits. The merits of the tandem suspension are such that the vast majority of loads can now be stabilized at forward speeds in excess of 150 kt, provided that due consideration is given to the power and control limits of the helicopter. Furthermore, external load transportation by helicopter should be independent of weather conditions.

Sheldon, DF *Vertica* Vol. 1 No. 4, 1977, pp 281-290, 31 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 175383
FEASIBILITY OF REDUCING ABSORBENT CUSHIONING MATERIAL FOR OVERPACKING HAZARDOUS LIQUIDS

This investigation was conducted at the request of HQ USAF. The objective of the investigation was to determine whether the quantity of noncombustible absorbent cushioning material used for overpacking unit containers of hazardous liquids can significantly be reduced from that presently specified in AFR 71-4, Preparation of Hazardous Materials for Military Air Shipment, by using plastic bags or liners inside the overpack containers. The plastic bag or liner would serve to confine liquids, in the event of leakage from unit containers, in overpack containers which are non-confining, such as fiberboard and unsealed wooden boxes. Results of this investigation indicate that the quantity of cushioning materials presently specified in AFR 71-4 is probably based on that required to absorb the entire liquid content from leaking unit containers in non-confining overpack containers and can significantly be reduced by using overpack containers designed to confine liquids. For those overpack containers not so designed, closed plastic bags or liners offer an effective method to achieve confinement. The utility of plastic bags for this application will depend on the compatibility of plastics with a wide variety of hazardous materials. (Author)

Thomas, EG
Air Force Packaging Evaluation Agency AFPEA-76-P7-12, PTPT-77-45, Dec. 1977, 13 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A049676/0ST

04 176627
AIR FREIGHT RATES, ANALYSIS AND TRENDS [Les tarifs aeriens de marchandises, Analyse et tendances]

An analysis of the work carried out by the ICAO since 1973 on international freight tariffs, and lists of the tariffs applied to air cargo from a number of large cities in 1973 and 1976 is presented.

ITA Bulletin No. 5, 1977, pp 55

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Institut du Transport Aerien, 4 Rue de Solferino, Paris (7e), France

04 176654
PROFILE OF AN ALL-CARGO B747 OPERATION

This first article of four discusses the passenger-to-cargo conversion of the Boeing 747 and its employment on the routes of Flying Tiger lines. The conversion entailed power plant modification sufficient to allow 733,000 lb take off weight.

McDonald, JF *Shell Aviation News* Vol. 443 1977, pp 22-27

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 176655
RATING PROVIDES THE INCENTIVE--BUT GROUND HANDLING HOLDS THE KEY

Consignments of cargo carried by air are taking between four and five times as long as is technically necessary in door-to-door movements, and in the two years since an international industry group of experts announced this finding, the few areas in which new techniques have been introduced have made little impact on the overall level of air cargo efficiency. The more widespread adoption of intermodal containers is meeting its biggest barrier in the continuing lack of shipper incentives in the complicated rating structures, but it is also clear that a new approach to ground handling is going to be needed.

Martin, F *Cargo Systems International* Vol. 4 No. 12, Dec. 1977, p 99

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

04 176718
POLICY ANALYSIS AND FORECASTING MODELS FOR U.S. DOMESTIC AIR CARGO MOVEMENTS

This study describes the modification and extension of a new disaggregate simulation freight demand analysis model, developed at the MIT Center for Transportation Studies, for analysis of air cargo. This model system utilizes existing published data in a sampling and simulation framework to develop estimates of modal shares for individual commodity groups in any specified U.S. domestic city pair market. Firms are assumed to minimize "total logistics cost", including storage, capital carrying and stockout costs as well as transport charges, in making modal choice decisions. The results of these individual decisions are accumulated and used to develop modal share estimates, which can then be used in preparing aggregate forecasts of modal flows. This study clearly demonstrates the feasibility of extending this demand analysis model to include analysis of air cargo. A description of the air cargo industry structure, and review of freight modelling data sources are presented. A critical review of previous work in air cargo demand analysis, along with pertinent work for surface modes, is then presented. After an explanation of the theoretical basis for the model system and its implementation, the extension of the model to air cargo analysis is described. A detailed analysis of the air cargo tariff structure is presented. Using a 1974 sample of domestic airbills, a variety of regression equations are estimated, which relate shipment rate to characteristics of the shipment and attributes of the commodity shipped. Empirical results are presented, and comparisons with

proposed alternatives rate structures made. The model system is applied to the Houston-Chicago and Los-Angeles-Boston market pairs. The empirical results are quite encouraging: the model is shown to give modal share estimates which are plausible when compared with existing commodity flow information. The study is concluded with a summary of important findings and areas for further research. /Author/

Wilson, LB
Massachusetts Institute of Technology CTS 77-12, July 1977, 171 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

04 176725
U.S. INTERNATIONAL AIR FREIGHT TRAFFIC
The publication focuses general attention on the U.S. two-way foreign trade and more particular attention on the movement of goods by air. Information presented includes the volume and value of air freight moving between the United States and other countries, the U.S. air carrier share of the market, and U.S. air carrier freight traffic and revenues, yields, load factors and aircraft operating costs. The report covers the U.S. Trunk, All-Cargo and Supplemental Air Carriers and provides data on the scheduled operations of all-cargo service as well as non-scheduled freight service. Coverage has been expanded with this issue to include both financial and traffic data for each subject area and some tables covering air freight forwarders have been included.

Civil Aeronautics Board No Date, n.p.

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Civil Aeronautics Board, 1825 Connecticut Avenue, NW, Distribution Section, Washington, D.C., 20428

04 176738
FREIGHT CARGOES OF AEA MEMBER COMPANIES BETWEEN 1972 AND 1976 ACCORDING TO LARGE TRAFFIC ZONES [Le traffic de fret des Compagnies membres de l'AEA de 1972 a 1976 par grande zone de trafic]
Statistical tables are presented to show the development of air cargo in kilometers for the 19 companies that belong to the Association of European Airlines. [French]

Servant, A *ITA Bulletin* Jan. 1978, pp 35-39, 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Institut du Transport Aerien, 4 rue de Solferino, Paris (7e), France

04 178253
A TIGER WITH AIR CARGO BY THE TAIL
This article describes the operations of the Flying Tiger line, an air freight company, following the deregulation of the air cargo business. Wholesalers, such as the Flying Tiger line, felt the effects of regulation. The carriers could not move into new routes or change their rates without the CAB's approval. The CAB generally kept rates unrealistically low; Flying Tiger made a profit on U.S. operations in only four of the last ten years. The regulators also make it impossible for carriers to build truly effective marketing networks. The new law allows "certified" carriers to serve any domestic markets they want to, and to charge whatever rates they decide upon, so long as the board does not consider them predatory. One way the Flying Tiger Line hopes to speed expansion and maximize the benefit of deregulation is to tie in the domestic service with more cities abroad. In addition, the company would like to enter the small-package business that is now dominated by the Federal Express, and the long-distance truck business. Eventually, the goal of the Flying Tiger Line is to operate its own warehouse and take over the entire task of inventory control for its customers. The profitable development of this system depends on whether Tiger is permitted to use trucks, because the movement of goods in this kind of service would often be over such short distance that air shipment would make no sense. Combining airplanes, trucks, and wharehousing services in one system would assure Flying Tiger the capability to take advantage of new transport technology and to cope with changing demands of shippers.

Loving, R, Jr *Fortune* June 1978, pp 116-124

ACKNOWLEDGMENT: Fortune
ORDER FROM: Time Incorporated, 541 North Fairbanks Court, Chicago, Illinois, 60611

04 179886
FREIGHTERS FOR THE REAL WORLD
Wide-body freighters such as the 747 Combi are carrying an increasing amount of freight traffic worldwide, but the world's freight airlines have an increasingly urgent need for a smaller aircraft to replace their narrow body types. Traditionally, this role has been filled by the McDonnell Douglas DC 8F family. The older DC 8's are mainly used by the newer freight operators for the simple reason that they are cheaper. The customer has to consider the total economics of air freight, including the advantage of speed and low damage rates, when contemplating its high cost. Boeing is developing a simple and effective method of predicting the growth of air freight markets and indicating what commodities are likely to move by air. Factors such as value per kilogram, market growth rate, density, fragility, and market time sensitivity are used to determine "air eligibility." One of the major problems facing every other freight carrier that relies on the DC 8 is the impending noise legislation which will force the DC 8's out service. Air freight, it is noted, is facing a problem in the mid-to-late 1980's in that it could find its development constricted by the lack of a suitable vehicle. The question now is whether the air cargo industry can support a pure freighter that will provide a returen on investment for its manufacturer and its operators? Developments in the industry suggest that the cargo airlines may turn to derivatives of military aircraft rather than airliners to fill the all-important DC-8 gap.

Flight International Vol. 114 N3618, July 1978, pp 297-300, 6 Phot.

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

04 180144
AIR FRANCE'S NEW 'FREIGHT' INSTALLATIONS AT CHARLES DE GAULLE AIRPORT AT ROISSY, FRANCE
The paper describes a new type of airport freight installation designed for greater mechanization on the runway side. The cargo dock, as it is called, enables continuous loading and unloading of large aircraft, made possible by raising by 5 m the zones of mechanized stock and introducing a mechanized conveyance path between these zones and the aircraft bridge, that takes into account the variations of height and inclination of the aircraft. Special liaison bridges are described. [French]

Gardez, MJ Roger, MM (Jeumont-Schneider, Puteaux, France) *Sciences et Techniques* Feb. 1978, pp 38-42

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-25261)
ORDER FROM: AIAA
A78-25261

04 180175
THE ROLE AND FUTURE FOR AIR FREIGHT BETWEEN THE UK AND CONTINENTAL MEMBERS OF THE EUROPEAN ECONOMIC COMMUNITY
Trends in air freight traffic between the U.K. and continental members of the European Economic Community (EEC) are discussed. Difficulties encountered by the air freight industry include tariff regulations; competition with containerized ground and sea transport systems; problems in cargo handling and door-to-door delivery; maximizing the usefulness of wide-body jets; and meshing of air, surface, and sea transport systems. Several improvements in the present situation could be effected by diversion of a large percentage of U.K. international freight to regional airports, thus reducing congestion at such centers as Heathrow; controlling inter-airline competition for limited markets; and linking of London, Amsterdam, Frankfurt, Zurich, and Paris in a "central Pentagon" of traffic, with transshipment avalable at each point.

From The Place of Aviation in Society; Proceedings of the 15th Anglo-American Aeronautical Conference, London, England, 31 May-2 June 1977 (A77-41926 19-03).

Sealy, K (Socio-Economic Planning Sciences)
Royal Aeronautical Society Proceeding 1977, 16 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-41941)
ORDER FROM: AIAA
A77-41941

04 180416

AIR TRANSPORT OF LIVESTOCK--ENVIRONMENTAL NEEDS

Guidelines are presented for the shipment of livestock by air freight. Recommendations are made for air temperatures, humidity levels, air movement, barometric pressure, ventilation rate, air quality, and thermal shock to provide for safe and humane transportation of livestock.

Presented at the ASAE Winter Meeting, Chicago, Illinois, December 13-16, 1977.

Stevens, DG Hahn, GL

American Society of Agricultural Engineers Proceeding ASAE 77-4523, 1978, 12 pp, Refs.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 180487

TECHNICAL AND ECONOMIC EVALUATION OF ADVANCED AIR CARGO SYSTEMS

The current air cargo environment and the relevance of advanced technology aircraft in enhancing the efficiency of the 1990 air cargo system are discussed. NASA preliminary design studies are shown to indicate significant potential gains in aircraft efficiency and operational economics for future freighter concepts. Required research and technology elements are outlined to develop a better base for evaluating advanced design concepts. Current studies of the market operation are reviewed which will develop design criteria for a future dedicated cargo transport. Design features desirable in an all-freighter design are reviewed. NASA-sponsored studies of large, distributed-load freighters are reviewed and these designs are compared to current wide-body aircraft. These concepts vary in gross takeoff weight from 0.5 Gg (one million lbs.) to 1.5 Gg (three million lbs.) and are found to exhibit economic advantages over conventional design concepts.

Conf-Presented at Forum on Airfreight Contribution in Securing Markets Abroad Aeroport de Paris, France, 17-18 Nov. 1977.

Whitehead, AH, Jr

Langley Research Center NASA-TM-78672, Feb. 1978, 38 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

N78-20108/4ST

05 133020
AIRPORT SURVEY FOR MLS MULTIPATH ISSUES
Eight major U.S. civilian airports were visited and data on the surface material of all sizable buildings visible from the runways were obtained. This information is catalogued. It is only with the aid of such information that we can address issues such as the likelihood of a system performance changes due to polarization, pattern control and coverage control. A total of 93 buildings and 123 surfaces are included and the breakdown between the various surfaces is as follows: 74 surfaces were corrugated; 17 surfaces were cinder block; 16 surfaces were brick; 9 surfaces were concrete; and, 5 surfaces were smooth metal. Of the 74 corrugated surfaces 18 were of the "flat" variety, 34 were one of five sub-categories and the remaining 22 needed 15 sub-categories for classification.

Shnidman, DA
Massachusetts Institute of Technology, Department of the Air Force, Federal Aviation Administration Proj. Rpt. FAA-RD-75-195, ATC-58, Dec. 1975, 85 pp

Contract DOT-FA74WAI-461

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A022937/7ST

05 143373
COLLISION AVOIDANCE SYSTEMS (A BIBLIOGRAPHY WITH ABSTRACTS)
Collision avoidance systems in three modes of transportation (i.e. air, surface, marine) are investigated in these Government-sponsored reports. Section 1 pertains to air transportation. Traffic scheduling, automatic ground based stations, and onboard warning systems are researched. (Contains 195 abstracts) Section 2 delineates sensors and detectors relative to marine transportation collision avoidance. (Contains 30 abstracts) Section 3 relates to engineering research relative to highway and rail collision avoidance. (Contains 24 abstracts) (This updated bibliography contains 248 abstracts, 50 of which are new entries to the previous edition.)
Supersedes NTIS/PS-75/671, and NTIS/PS-75/036.

Habercom, GE, Jr
National Technical Information Service Report Sept. 1976, 259 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-76/0682/5ST

05 154727
RADAR PERFORMANCE MONITOR
The Radar Performance Monitor continuously monitors an ASR radar figure of merit, which is a function of the radar transmit power and the radar receiver sensitivity. The transmitted radar signals are received by the Monitor through free space RF coupling or direct connection to the radar, delayed in time, and retransmitted to the radar through the same signal paths. Through automatic adjustment of the retransmitted signal power from the monitor, a constant retransmitted signal to the radar system noise ratio at the radar video output is maintained. Any significant reduction of radar transmitted power and/or degradation of radar receiver sensitivity causes an adjustment of the Monitor retransmitted signal power level in order to maintain the same signal to noise ratio at the radar video outputs. When a preset Monitor retransmitted power threshold is exceeded, visual and aural alarms are activated. (Author)

Siaurusaitis, A
Westinghouse Defense and Space Center Final Rpt. FAA-RD-76-121, Mar. 1976, 85 pp

Contract DOT-FA71WA-2570

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A035297/1ST

05 154890
ESTIMATION OF UG3RD PRODUCTIVITY IMPACTS
This study estimates the value of savings attainable from reduced Air Traffic Service staff requirements associated with implementation of the Upgraded Third Generation Air Traffic Control System (UG3RD). Estimates of staff requirements, assuming either a continuation of the present air traffic control system or alternatively, various UG3RD improvements, were prepared from an analysis of specific job functions at sample facilities. Sample estimates were expanded to provide estimates of required staff at all centers and 30 selected TRACONS and/or terminals for the period 1976 and 2000. Manpower differentials were calculated and valued at an average 1975 wage plus benefit cost. (Author)

Rodgers, JM
Federal Aviation Administration Final Rpt. FAA-AVP-77-4, Jan. 1977, 58 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A036772/2ST

05 154897
AN ECONOMETRIC ANALYSIS OF ENROUTE AND TERMINAL AIR TRAFFIC CONTROL
This study was undertaken in connection with a comprehensive evaluation of proposed new investments in the upgraded Third Generation Air Traffic Control System. It involved a quantitative analysis of the relationship between ATC system outputs and inputs. Outputs are defined in terms of operations handled while inputs consist of labor and capital. Separate production functions were estimated for enroute (ARTCC) and terminal (tower) control operations. In each case, two different sets of data were used. One consisted of a cross-section of observations on individual facilities in a single year. The other was a time series of annual observations on that portion of the system taken as a whole. Following development of the production functions, an optimality analysis was conducted. Estimates of the unit cost of labor and capital were developed. These were combined, via a mathematical optimization procedure, with the preferred production functions to compute least-cost combinations of labor and capital for various levels of ATC service demand. The results indicate that, for both centers and towers, substantial additions to the net capital stock will be required over the years to come if expansion of the system (to meet growing service demand) is to be economically efficient. (Author)
Prepared in cooperation with Administrative Sciences Corp., Alexandria, Va., Rept. no. ASC-R-110.

Eskew, HL Frazier, TP Smith, BM
Administrative Sciences Corporation Final Rpt. FAA-AVP-77-1, June 1976, 79 pp

Contract DOT-FA76WA-3769

ACKNOWLEDGMENT: NTIS
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AD-A036892/8ST

05 154899
ESTIMATION OF UG3RD DELAY REDUCTION
The study estimates aircraft and passenger delays that will be encountered at 30 large terminals during the period 1976 through 2000. Delay estimates are prepared for two scenarios--(1) no change in existing runway capacity and (2) changes in future runway capacity resulting from the introduction of the Upgrated Third Generation Air Traffic Control System (UG3RD). Delay estimates were obtained from application of a deterministic, steady state runway queuing model. Results of this research were incorporated in a cost-benefit analysis of the UG3RD ATC system. (Author)

Rogers, RA Drago, VJ Cheaney, ES
Battelle Columbus Laboratories Final Rpt. FAA-AVP-77-7, Jan. 1977, 69 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A036894/4ST

05 154900
ESTIMATION OF UG3RD SAFETY BENEFITS
This study estimates the value of aviation safety improvements that could be obtained by implementing various alternative configurations of the Upgraded Third Generation ATC System. Estimates are based on the central assumption that the frequency of aviation accidents per operation observed in the past will be repeated unless identifiable steps are undertaken to eliminate specific classes of accidents. Recent accident data on midair collisions and controlled collisions with the terrain were examined to identify types of accidents that could be prevented by the UG3RD. Preventable accident rates were calculated and used to forecast future accidents under an extension of today's system and accidents that could be prevented by the UG3RD. (Author)

Simpson, TR Smith, AP Matney, JS
Mitre Corporation Final Rpt. FAA-AVP-77-8, Jan. 1977, 79 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A036895/1ST

05 154922
ESTIMATION OF UG3RD CAPACITY IMPACTS
This study provides airport runway capacity estimates for the top 30 U.S. air carrier airports for the FAA's Upgraded Third Generation ATC System Cost Benefit Study. The capacity estimates were made at five year intervals for both IFR and VFR conditions for the baseline and the five alternative configurations defined for the cost benefit study. The results indicate that if the UG3RD Generation ATC system is fully implemented by 1990 and if wake vortex conditions are favorable then nearly a 40% increase in capacity could be realized at the top 30 air carrier airports under IFR conditions and an increase of 23% under VFR conditions. The greatest increase in IFR capacity (48%) accrues to those airports which use a dual-lane runway configuration as their predominant mode of operations in IFR conditions. This increase in capacity is expected to reduce terminal area delays. (Author)

Smith, AP
Mitre Corporation Final Rpt. FAA-AVP-77-9, MTR-7138, Jan. 1977, 109 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A037079/1ST

05 154937
WIND SHEAR: A LITERATURE SEARCH, ANALYSIS, AND ANNOTATED BIBLIOGRAPHY
A literature search of recent publications (post 1970) on low-altitude wind shear and its relationship to aircraft operations during approach, landing, and takeoff was made. An analysis of the reviewed literature with respect to (1) wind shear characterization/atmospheric modeling, (2) hazard definition/accident analysis, (3) ground-based equipment, (4) airborne equipment, (5) flight test and simulation, (6) forecasting/meteorology, and (7) flight operations/pilot training was made. The analysis of the 216 documents identified by the search are summarized. (Author)

Shrager, JJ
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-76-114, FAA-NA-77-5, Feb. 1977, 95 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A037310/0ST

05 154975
POLICY ANALYSIS OF THE UPGRADED THIRD GENERATION AIR TRAFFIC CONTROL SYSTEM
This report provides a review of costs and benefits of the Upgraded Third Generator Air Traffic Control System (UG3RD) from a systems perspective and also reviews the feasibility and effectiveness of complementary policy strategies. The analysis values the costs and benefits of five alternative systems composed of potential combinations of UG3RD components. For each system, the added cost of airport and airway service was quantified for both the Federal Aviation Administration (FAA) and for airway users. Benefits consisted of increased airport capacity and reduced delay, savings from reduced FAA staff requirements, and improved airway system safety. In addition to estimating costs and benefits of various investments, the study investigates the impacts of airport quotas and peak pricing, increased use of satellite airports, and terminal control areas. (Author)

Fromme, WR Rodgers, JM
Federal Aviation Administration Final Rpt. Jan. 1977, 155 pp

ACKNOWLEDGMENT: NTIS
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AD-A037801/8ST

05 155690
A NESTED QUEUE MODEL FOR THE ANALYSIS OF AIR TRAFFIC CONTROL SECTORS
This paper deals with the interaction between the airplane traffic and the control communications traffic in an air traffic control (ATC) sector. The concept of nested queue systems is introduced, aned is used to model the above air traffic situation. It is shown that under certain assumptions, some operating characteristics useful in the design and analysis of air traffic sectors can be analytically derived. /Author/

Modi, JA *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 219-224, 2 Fig.

ORDER FROM: ESL

05 155691
APPLICATION OF HUMAN FACTORS DATA TO ESTIMATING AIR TRAFFIC CONTROL CONFLICTS
This paper seeks to define and estimate the frequency of aircraft interactions (called conflicts) which entail controller intervention. The task of conflict detection is viewed as a stimulus response process in which the strength of stimulation is a particular closet-approach separation between aircraft, and the corresponding probability or response is the fraction of times controllers judge that separation to be a potential violation of the 5 nautical mile minimum separation standard. Data from human factors studies of air traffic control are used to estimate response probabilities for a wide range of closest-approach separations. Two types of response probability are defined. The first type (normative) predicts when controllers should intervene based on an analysis of human and equipment errors in the air traffic control process. The second type (descriptive) predicts when controllers actually intervene based on data from real-time simulations of conflict detection. These response probabilities are incorporated into an empirical model for estimating the expected number of conflicts in a specified time using data from ATC flight-progress strips. /Author/

Dunlay, WJ Horonjeff, R *Transportation Research* Vol. 8 No. 3, Aug. 1974, p 205, 11 Fig., 3 Tab., 16 Ref.

ORDER FROM: ESL

05 158541
CURRENT AVIATION STATISTICS, AIR TRAFFIC ACTIVITY, TERMINAL AREA RELATIONSHIPS, FISCAL YEAR 1976
The current study of terminal area airport operations encompasses FY 1976 data for 415 airports at which FAA traffic control towers operated the entire twelve months period. These are presented in two primary groups: Air Commerce Airports, and General Aviation Airports. Each tower is requested to report the peak daily traffic count during the previous twelve months for air carrier, itinerant (including air carrier), total aircraft (including local) and instrument operations. Peak counts for the various categories need not occur on the same day. These peak days can be accurately identified from the daily traffic counts recorded on FAA Form 7230-1. Busy hour estimates are obtained from periodic counts 60 minutes in duration. These counts are made during known high activity periods of each traffic category. From this sample, tower personnel select a count which is representative of daily busy hour activity for each category. The tables contain traffic estimates for each airport at which an air traffic control tower operated furing all of FY 1976. Provided with peak day and busy hour are average day and hour operations computed from annual operations. Measures of peaking characteristics are given by the ratios of peak day to average day and busy hour to average hour for individual airports and airport size groups. (Author)
See also AD-A032 605.

Thompson, GE
Federal Aviation Administration Mar. 1977, 59 pp

ACKNOWLEDGMENT: NTIS
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AD-A038847/0ST

05 159065
AIRLINE DELAY TRENDS, 1974-1975, A STUDY OF BLOCK TIME DELAYS, GROUND AND AIRBORNE, FOR SCHEDULED AIR CARRIERS
Estimates of block, airborne and ground delays for route segments flown by United States domestic scheduled airlines operating out of twenty large airports are presented in this document. The data were determined from the

CAB ER-586 Service Segment data base, which provides monthly operational times, both ground and airborne, for all route segments receiving scheduled air carrier service. The data in this report are limited to the three-hundred and thirty route segments connecting the twenty airports included in the study. Average monthly estimates of the ground and airborne components of block delays, defined as delays encountered from "ramp to ramp" on a route segment, are presented for the two-year period from 1974-1975. Average monthly estimates of delays for the airborne portion of the segment ("wheel off" to "wheels on") are categorized according to (1) route segment, (2) airline, (3) aircraft type and (4) local scheduled arrival or departure time. Average monthly estimates of delays for the ground portion of the route segments are categorized according to departure and arrival ground times at the twenty airport locations included in the study. These estimates of ground delays are further categorized into "busy" time intervals (07:00- 22:59) and "dull" time intervals (23:00-06:59). (Author)

See also Rept. no. FAA-EM-74-11-Vol-1, AD-A015 870. Availability: Microfiche copies only.

Condell, HM Horowitz, SM Kaprelian, AS
Transportation Systems Center Ann. Rpt. FAA-EM-77-2, TSC-FAA-77-6, Mar. 1977, 218 pp

ACKNOWLEDGMENT: NTIS
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AD-A039483/3ST

05 159123
CENTRAL FLOW CONTROL AUTOMATION PROGRAM COST-BENEFIT ANALYSIS

This report contains an analysis of the benefits and costs associated with the Central Flow Control Automation Program. It presents the projected benefits and costs of both the current system and proposed system in terms of present-value dollars. Resultant benefit and cost differentials are discussed in terms of net present value and benefit-to-cost ratio. The sensitivity of these measures to major program uncertainty is described. (Author)

Broglio, CJ Hannan, TL
Federal Aviation Administration Final Rpt. FAA-RD-77-53, Sept. 1976, 54 pp

ACKNOWLEDGMENT: NTIS
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AD-A040060/6ST

05 164935
SECONDARY SURVEILLANCE RADAR (SSR)--3 [Radar secondaire de surveillance (SSR)--3]

The second part of the article describes the performance characteristics of the SSR. It is concluded that the SSR can meet the requirements of the future traffic foreseeable until the year 2000 even in high-density zones if the problems posed by garbling are resolved. Different foreseeable evolutions of the system to eliminate garbling are examined. Three types of solutions are presently studied: two with selective addressing, one within the framework of a specialized system (ADSEL/DABS), another within the framework of the integrated system of CNI; the third with stochastic emission os responses to secondary radar interrogations (SRSSR). [French]

Milosevic, L (Thomson-CSF, France) *Onde Electrique* Vol. 56 No. 12, Dec. 1976, pp 499-504, 16 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

05 165982
ESTIMATION OF UG3RD COSTS

The study estimates the additional costs that would be incurred by both the FAA and airport and airway users as a result of implementation of the Upgraded Third Generation Air Traffic Control System (UG3RD). Annual cost estimates are provided for engineering and development, facility and equipment expenditures, and maintenance expenses for the period 1976 through 2000. Separate cost detail is provided for the Discrete Address Beacon System, Intermittent Position Control, Control Automation, and the Wake Vortex Avoidance System. These components, in various combinations, have been evaluated as part of a cost-benefit analysis of the UG3RD system. In addition, certain unit costs were estimated for use in valuing potential UG3RD benefits. These costs consisted of the value of passenger time, aircraft operating costs, and the costs of aviation accidents and fatalities. (Author)

Reck, R O'Brien, A Adil, A Rempfer, D Benjamin, W
Transportation Systems Center Final Rpt. FAA-AVP-77-10, TSC-WP-420-C4-17, Jan. 1977, 117 pp

ACKNOWLEDGMENT: NTIS
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AD-A040389/9ST

05 166151
AIR TRAFFIC CONGESTION AND CAPACITY (A BIBLIOGRAPHY WITH ABSTRACTS)

Present and predicted air traffic density and capacity, both en route and in airport environments, is analyzed in these research reports. Terminal area scheduling, runway queueing, and airspace regulation are discussed. (This updated bibliography contains 146 abstracts, 24 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0495, and NTIS/PS-75/376.

Habercom, GE, Jr
National Technical Information Service July 1977, 151 pp

ACKNOWLEDGMENT: NTIS
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NTIS/PS-77/0567/6ST

05 166643
AIR TRAFFIC CONTROL SIMULATION MODELS (A BIBLIOGRAPHY WITH ABSTRACTS)

En-route and terminal air traffic control facilities are investigated by use of mathematical models and computerized simulations. Ground based and satellite navigational aids are modeled for present and predicted air traffic requirements. Worldwide networks for traffic scheduling are simulated. (This updated bibliography contains 301 abstracts, 59 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0610, and NTIS/PS-75/521.

Habercom, GE, Jr
National Technical Information Service Bibliog. Aug. 1977, 306 pp

ACKNOWLEDGMENT: NTIS
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NTIS/PS-77/0702/9ST

05 167211
A COMMUNICATIONS SYSTEM FOR THE TERMINAL AREA EFFECTIVENESS PROGRAM

The terminal area effectiveness program has the broad scope of evaluating air traffic control (ATC) procedures. One area of interest is pilot acceptance of complex ATC procedures. A means to measure this acceptance is described by studying the impact on pilots of meeting the ATC procedural requirements. The concept-testing system configuration, its operation, and its performance are discussed.

Fetter, JL
Langley Research Center NASA-TM-73227, A-6980, June 1977, 23 pp

ACKNOWLEDGMENT: NTIS
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N77-27794/5ST

05 167217
TERMINAL AREA AIR TRAFFIC CONTROL SIMULATION

To study the impact of advanced aeronautical technologies on operations to and from terminal airports, a computer model of air traffic movements was developed. The advantages of fast-time simulation are discussed, and the arrival scheduling and flight simulation are described. A New York area study, user's guide, and programmer's guide are included.

Aerospace Corporation Final Rpt. NASA-CR-152017, June 1977, 240 pp

Contract NAS2-6473

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27881/0ST

05 168953
AIR TRAFFIC CONTROL EXPERIMENTATION AND EVALUATION WITH THE NASA ATS-6 SATELLITE. VOLUME I. EXECUTIVE SUMMARY
The U.S. Department of Transportation (DOT), Federal Aviation Administration (FAA) program for air traffic control (ATC) experimentation and evaluation with the ATS-6 satellite was part of the Integrated ATS-6 L-Band Experiment. All tests were performed between September 1974 and April 1975. The U.S. DOT aeronautical program consisted of both ATC communications demonstration and technology tests. In support of the aeronautical satellite (AEROSAT) program, tests were designed to collect satellite-aircraft signal propagation data, evaluate L-band avionics hardware designs, and perform preliminary satellite voice and data communications demonstration tests.

See also Volume 2, AD-A042 146.

Protopapa, S
Transportation Systems Center Final Rpt. FAA/RD-75-173-1, TSC-FAA-76-22-1, Aug. 1977, 43 pp

Contract DOT-TSC-707-1

ACKNOWLEDGMENT: NTIS
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AD-A046509/6ST

05 168957
EVALUATION OF THOMSON/CSF FIVE-BAY VOR ANTENNA
A stacked five-bay VOR antenna was evaluated at the National Aviation Facilities Experimental Center (NAFEC). The antenna was designed for use with a conventional very high frequency omnidirectional radio range (VOR) system to reduce multipath effects by diminishing ground reflections. Tests included airborne and ground measurements to assure operational compatibility of the antenna with FAA transmitting equipment. Measurements were made on the complete array, bays, and antenna elements. Test results indicated that the bearing error was marginal and the large sidelobes caused multipath reflection from nearby obstacles. A computer program used for the analysis of vertical plane radiation patterns in stacked arrays is included. (Author)

Dong, JG
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-82, FAA-NA-77-7, Oct. 1977, 77 pp

ACKNOWLEDGMENT: NTIS
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AD-A046756/3ST

05 169052
MONTE CARLO SIMULATIONS OF VOR/DME HOLDING PROCEDURES. BASIC IDEAS AND APPLICATIONS
Using DME in addition to VOR allows a better use of the airspace for holding procedures in civil aviation. As yet, there are no procedures for the construction of the airspace to be reserved for a safe execution of these holding procedures, which have been agreed by the international authorities. A method for the construction of holding areas of different probabilities is described, where the simulation of flight paths in a computer using the Monte-Carlo technique has a special importance. The simulation allows the application of an extensive and detailed error model. In addition, the locally different physical conditions may be taken into consideration. Both factors are most important for a safe and economical use of the airspace.

Misc-Report Will Also Be Announced as Translation (Esa-TT-419). In German; English Summary.

Schnuerer, H
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-FB-77-08, Mar. 1977, 25 pp

ACKNOWLEDGMENT: NTIS
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N77-30105/9ST

05 169067
REAL-TIME MANNED SIMULATION OF ADVANCED TERMINAL AREA GUIDANCE CONCEPTS FOR SHORT-HAUL OPERATIONS
A real-time simulation was conducted of three-dimensional area navigation and four-dimensional area navigation equipped (STOL) aircraft operating in a high-density terminal area traffic environment. The objectives were to examine the effects of 3D RNAV and 4D RNAV equipped aircraft on the terminal area traffic efficiency, and to examine the performance of an air traffic control system concept and associated controller display proposed for use with advanced RNAV systems. Three types of STOL aircraft were simulated each with different performance capabilities. System performance was measured in both the 4D mode and in a 3D mode; the 3D mode, used as a baseline, was simply the 4D mode less any time specification. The results show that communications workload in the 4D mode was reduced by about 35 percent compared to the 3D, while 35 percent more traffic was handled with the 4D. Aircraft holding time in the 4D mode was only 30 percent of that required in the 3D mode. In addition, the orderliness of traffic was improved significantly in the 4D mode.

Subm-Prepared in Cooperation with the Natl. Aviation Facilities Exptl. Center, Atlantic City, N. J.

Tobias, L Obrien, PJ
Ames Research Center NASA-TN-D-8499, A-6841, Aug. 1977, 33 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-29111/0ST

05 169182
INTERMITTENT POSITIVE CONTROL--PHASE I. OPERATIONAL TEST AND EVALUATION
This report reflects the results of an effort at the National Aviation Facilities Experimental Center (NAFEC) to test and evaluate the interface between the intermittent positive control (IPC) system and the enroute air traffic controller. In testing this interface, the IPC algorithm was resident in the Digital Simulation Facility, which simulated the operation of a Discrete Addresss Beacon System (DABS). The test series was operationally oriented and did not consider such factors as program size, loading factors, or processing time. The results of the tests reveal that the IPC controller alerts, consistency of commands, readability of displayed information, and method of displaying information to the controllers were acceptable. The issuance of negative commands to aircraft presents a problem to the controllers, in that negative phraseology is not utilized in the air traffic control system. The alerting methods of IPC and conflict alert are similar, but because of the critical timing of the IPC alert, it was felt that a distinctly different alert for IPC should be utilized.

Goodwin, JW
National Aviation Facilities Experimental Center Intrm Rpt. FAA-RD-77-125, FAA-NA-77-12, Oct. 1977, 18 pp

ACKNOWLEDGMENT: NTIS
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AD-A047249/8ST

05 169220
BENEFITS OF MLS GUIDANCE FOR CURVED APPROACHES. VOLUME II. OPERATIONAL BENEFITS FOR NEW YORK AIRPORTS
Projected benefits of curved approaches during marginal VFR and IFR weather conditions provided by implementing MLS at LaGuardia and Kennedy are investigated. It is shown that the operational flexibility due to MLS contributes the following benefits: increases in capacity at LGA during IFR and marginal VFR conditions, reductions in airport noise exposure over populated areas around JFK and LGA, reductions in NASCOM delays at LGA and savings in operating costs for airlines by terminal route reductions.

Iyer, RR
Mitre Corporation, Federal Aviation Administration Tech Rpt. MTR-6951-V2, July 1975, 52 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
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PB-274585/9ST

05 169222
REQUIREMENTS FOR 3500 FOOT SPACINGS FOR SIMULTANEOUS PARALLEL IFR APPROACHES
The report presents the requirements for lowering the current 4300 foot rule for simultaneous parallel IFR approaches. Of especial interest are changes to 3500 feet or lower. An analysis is made, based upon the assumed introduction of a very accurate, high update rate surveillance system for special purpose use for monitoring parallel approaches.

Haines, AL
Mitre Corporation, Federal Aviation Administration Tech Rpt. MTR-6841, Jan. 1975, 36 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
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PB-274589/1ST

05 169223
CONCEPTS FOR DETERMINATION OF LONGITUDINAL SEPARATION STANDARDS ON FINAL APPROACH

The concept of a longitudinal separation standard on final approach requires precise definitions in order to develop an analytical structure. These are developed in this paper with a view toward identifying the relationships between separation standards and the variables describing the final approach environment. This provides a basis for systematic evaluation of changes in separation standards due to changes in the environment, particularly through Engineering and Development products. Analytical relationships are developed primarily for IFR conditions, represented by strict adherence to all applicable ATC rules and procedures. For modeling purposes, relationships are also developed for 'standards' for VFR conditions, represented by visual approaches from an IFR flight plan.

Haines, AL
Mitre Corporation, Federal Aviation Administration Tech Rpt. MTR-7047, Oct. 1975, 44 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
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PB-274590/9ST

05 169398
THE SINGLE-SITE COLLISION AVOIDANCE SYSTEM (SS-CAS)

SS-CAS is a unique beacon collision avoidance system which works in conjunction with the current and next generation air traffic control surveillance systems (ATCRBS and DABS). In its passive mode, SS-CAS provides three dimensional position of both user and target aircraft using beacon replies from only one ground-based DABS or ATCRBS interrogator. Full collision avoidance service is provided in both the all-ATCRBS environment of today, the all-DABS environment of tomorrow, and the intervening transition period. The ground and airborne equipments required are add-ons to the ground beacon and the airborne DABS units. A two-way data link separate from, but compatible in format with, the DABS data link provides the SS-CAS-Equipped aircraft with important site data. A tracker capable of reading reliable tracks through ATCRBS synchronous garble is employed. DABS replies arrive gargle-free at the SS-CAS aircraft and are simple to track. An active mode and multi-site usage capability are available for performance enhancement in identified special situations. This report fully describes the SS-CAS concept as it functions in the all-ATCRBS, all-DABS and transition environments. (Author)

Schuchman, L Orr, R
Stanford Telecommunications, Incorporated FAA-EM-77-8, Sept. 1977, 150 pp

Contract F04701-75-C-0239

ACKNOWLEDGMENT: NTIS
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AD-A045977/6ST

05 169476
PRELIMINARY LIMITED SURVEILLANCE RADAR (LSR) COST/BENEFIT ANALYSIS

This report presents the findings of a cost/benefit analysis of the deployment of a new Limited Surveillance Radar (LSR). An LSR is an inexpensive, single channel, short-range (about 20 miles), primary radar for use at approach control facilities which cannot economically justify an Airport Surveillance Radar/Radar Beacon System (ASR/RBS). An LSR can also be used in tower cabs to aid in VFR operation where a BRITE display is not feasible due to coverage limitations dictated by obstructions or distance from the parent radar facility. The study is preliminary in that it is brief and uses rough estimates and assumptions for both benefits and costs. Its purpose is to give a gross estimate of the current deployment potential of the LSR and to aid in decisions regarding further system analysis, development, and testing. (Author)

Rempfer, PS
Transportation Systems Center Final Rpt. FAA-ASP-77-10, TSC-FAA-77-16, Oct. 1977, 52 pp

ACKNOWLEDGMENT: NTIS
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AD-A046829/8ST

05 169580
MULTIPLE CURVED DESCENDING APPROACHES AND THE AIR TRAFFIC CONTROL PROBLEM

A terminal area air traffic control simulation was designed to study ways of accommodating increased air traffic density. The concepts that were investigated assumed the availability of the microwave landing system and data link and included: (1) multiple curved descending final approaches; (2) parallel runways certified for independent and simultaneous operation under IFR conditions; (3) closer spacing between successive aircraft; and (4) a distributed management system between the air and ground. Three groups each consisting of three pilots and two air traffic controllers flew a combined total of 350 approaches. Piloted simulators were supplied with computer generated traffic situation displays and flight instruments. The controllers were supplied with a terminal area map and digital status information. Pilots and controllers also reported that the distributed management procedure was somewhat more safe and orderly than the centralized management procedure. Flying precision increased as the amount of turn required to intersect the outer mark decreased. Pilots reported that they preferred the alternative of multiple curved descending approaches with wider spacing between aircraft to closer spacing on single, straight in finals while controllers preferred the latter option. Both pilots and controllers felt that parallel runways are an acceptable way to accommodate increased traffic density safely and expeditiously.

Hart, SG McPherson, D Kreifeldt, J Wemple, TE
Ames Research Center NASA-TM-78430, Aug. 1977, 20 pp

Contract NGL-05-046-002

ACKNOWLEDGMENT: NTIS
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N77-32104/0ST

05 169739
THE IMPACT OF A PROPOSED ACTIVE BCAS ON ATCRBS PERFORMANCE IN THE WASHINGTON, D. C., 1981 ENVIRONMENT

A computer model of the proposed active Beacon Collision Avoidance System (BCAS) was developed to investigate the impact of BCAS on the Air Traffic Control Radar Beacon System (ATCRBS) ground system. Predictions were made for the early 1981 Washington, D.C., environment. Two ground environments were simulated, an all-ATCRBS environment and a 25%/75% Discrete Address Beacon System (DABS)/ATCRBS mix. Airborne fruit rates and the effect of BCAS/DABS mode power programming on interference were also predicted. (Author)

Theberge, N
IIT Research Institute, (649E) Final Rpt. FAA-RD-77, ECAC-PR-77-37, Sept. 1977, 48 pp

Contract DOT-FA70WAI-175

ACKNOWLEDGMENT: NTIS
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AD-A048589/6ST

05 169741
OBJECTIVE MEASUREMENT OF VOICE CHANNEL INTELLIGIBILITY

Following the results of a feasibility study (Hartman and Boll, 1976) an objective intelligibility measure is developed using a large data base consisting of 8-50 word phonetically balanced word groups with twelve different kinds of distortion. Justification for the use of this particular measure is included, with mathematical derivations and physical interpretations. A discussion of the feasibility of a hardware implementation of the software developed here is also included. (Author)

Gamauf, KJ Hartman, WJ
Institute for Telecommunication Sciences Final Rpt. FAA-RD-77-153, Oct. 1977, 75 pp

Contract DOT-FA74WAI-448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A048611/8ST

05 170191
ALL-WEATHER AUTOMATIC LANDING CONCEPTS AND OPERATIONS: REVIEW OF AEROSPATIALE EXPERIENCE

This paper reviews Aerospatiale's experience and achievements in the field of all-weather automatic landing and describes the Automatic Flight Control Systems installed on the following aircraft: Caravelle, equipped with a fail-passive system; Airbus, equipped with a "double-multiple"-type, fail-operational system; and Concorde, equipped with a duplicated monitored-type fail-operational system. The certification conditions are discussed for each of these systems together with a brief description of their design principles and operational limits. Finally, the experience gained by the French domestic airline Air Inter in the field of low-visibility automatic landing with its Caravelles is detailed both as far as the means implemented and the results obtained are concerned.

Negre, Y *Journal of Aircraft* Vol. 14 No. 4, Apr. 1977, pp 323-326

ACKNOWLEDGMENT: EI
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05 172721
VISUAL RANGE: CONCEPTS, INSTRUMENTAL DETERMINATION, AND AVIATION APPLICATIONS

A review is given about the principles, procedures, and instruments used in the measurement of visual range. The fundamental concepts of the visual range of objects and lights are discussed. The principles of operation of the several classes of atmospheric attenuation meters are reviewed and representative instruments are described. The course of development of the NBS transmissometer, its validation and application to aviation operations is reported. An error analysis is made of the effects of instrument errors and of differences in observer thresholds on visibility measurements.

Douglas, CA Booker, RL
National Bureau of Standards Monograph No. 159, June 1977, 362 pp, 130 Ref.

ACKNOWLEDGMENT: EI
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05 172724
AGGREGATE FLOW MODEL FOR EVALUATING ATC PLANNING STRATEGIES

An aggregate traffic flow model is developed and used to evaluate the potential benefits of automated, facility-level, on-line air traffic flow control. The model monitors and dynamically adjusts traffic flow rates and traffic densities on the routes in the ATC network. The route flow adjustments are based on controller workload criteria, with the intent of eliminating traffic surges and the associated periods of excessive workload. The model is used to evaluate two flow control strategies with respect to aircraft delay, controller workload, and staffing considerations at Los Angeles Air Route Traffic Control Center.

Wong, PJ (Stanford Research Institute) Couluris, GJ Schmidt, DK *Journal of Aircraft* Vol. 14 No. 6, June 1977, pp 527-532, 7 Ref.

ACKNOWLEDGMENT: EI
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05 172742
COMPUTER ARCHITECTURES FOR ADVANCED AIR TRAFFIC CONTROL APPLICATIONS

This paper investigates multi-mini (or micro) processor configurations suitable for advanced highly reliable ATC applications. Two specific examples, one a proposed design of an airborne computer for a future conflict avoidance system and the other a prototype surveillance site processor are discussed.

Proceeding of the Intl Conf on Parallel Process, Wayne State University, Detroit, Michigan, August 24-27, 1976.

Zollinger, A (Federal Aviation Administration)
Institute of Electrical and Electronics Engineers Proceeding IEEE [illegible], 1976, pp 132-139, 8 Ref.

ACKNOWLEDGMENT: EI
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05 172744
FAILURE DETECTION BY PILOTS DURING AUTOMATIC LANDING: MODELS AND EXPERIMENTS

A model is proposed for the performance of a pilot as a failure detector of instrument failures (additive dynamic biases) during an automatic landing. The model consists of two stages: a linear estimator and a decision mechanism. The linear estimator is the Kalman filter determined from a simplified model of displayed-variable dynamics used by the pilot. The filter also accounts for the pilot's time sharing between instruments through increased noise. The decision mechanism is based on classical sequential analysis with modifications for the failure detection case. An experiment designed to test the validity of the model was conducted.

Gai, EG (Massachusetts Institute of Technology) Curry, RE *Journal of Aircraft* Vol. 14 No. 2, Feb. 1977, pp 135-141, 16 Ref.

ACKNOWLEDGMENT: EI
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05 172745
FLIGHT EXPERIENCE WITH AIRCRAFT TIME-OF-ARRIVAL CONTROL

A research program on STOL operating systems is underway at the Ames Research Center. One investigation is concerned with design, analysis, and flight test of promising 4-D RNAV (four-dimensional area navigation) system concepts. While the flight paths that can be flown and the control system are aircraft dependent, the 4-D RNAV system concept is not. Hence, the work is applicable to CTOL aircraft. One promising system generates a capture flight path from the present aircraft position to a waypoint on a selected fixed-approach route. It predicts arrival time at the runway and controls time and position along the path. The system was flight tested, using a digital avionics system, on a Convair 340 and on an experimental powered-lift STOL airplane. Flight tests in the flight director mode show that the pilot can choose and change the desired time of arrival and meet this time within a few seconds, in spite of navigation errors and varying winds. Initial tests of the automatic mode using the NASA Augmentor Wing Jet STOL Research Aircraft (AWJSRA) show that good time control was achieved without objectionable throttle activity.

Neuman, F (Ames Research Center) Lee, HQ *Journal of Aircraft* Vol. 14 No. 2, Feb. 1977, pp 104-110, 7 Ref.

ACKNOWLEDGMENT: EI
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05 172747
COMMUTATED DOPPLER MICROWAVE LANDING SYSTEM FOR AIRCRAFT-- 3

The first two parts of this series of articles on the Microwave Landing System (MLS) which will eventually replace the Instrument Landing System (ILS) appeared in earlier issues (part 1 by Ron S. Barrat published in Syst Technol n 21 Jun 1974 p 15-21; part 2 published by R.S. Barrat and J.M. Chambers in Syst Technol n 23 Mar 1976 p 21-28). These articles gave the background to MLS and a description of the ground subsystem. The present article summarizes the two earlier articles and goes on to describe in detail the airborne subsystem and some of the trials results.

Barratt, RS Lawson, RK *Systems Technology* No. 25, Dec. 1976, pp 32-40, 2 Ref.

ACKNOWLEDGMENT: EI
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05 172748
FIELD TESTING OF VHF DATA LINK FOR AIR-GROUND DATA COMMUNICATIONS

The U. S. Department of Transportation has conducted a test program to determine the performance achievable by the minimum shift key (MSK) modem technique in air-ground data links. The method by which MSK may be used in the VHF air-ground data link system is described. The impact of performance limitations of existing equipment is described and experimental results obtained during ground tests and two flight test series are reported. It is shown that intersymbol interference and multipath are the predominant effects which must be characterized and modeled to obtain an accurate estimate of performance.

IEEE Vehicle Technology Group Annual Conf (27th), Orlando, Florida, March 16-18, 1977.

Salwen, H (Protcon Association, Incorporated) Collins, D
Institute of Electrical and Electronics Engineers Proceeding IEEE 77CH1176-7VT, 1977, pp 258-266, 2 Ref.

ACKNOWLEDGMENT: EI
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05 172749
MICROPROCESSOR-CONTROLLED COMMUNICATIONS IN AN ADVANCED INSTRUMENT LANDING SYSTEM
The application of 4-bit microprocessors to the communication of the control and status signals found in an advanced aircraft instrument landing system is presented. The advantages as well as some of the peculiarities of such an approach are described. Among the benefits, one must include the possibility of a very convenient and understandable human interface.

Belter, SE (Purdue University) Williams, CR Bass, SC *IEEE Transactions on Aerospace & Electronic System* Vol. AES No. 6, Nov. 1976, pp 698-705

ACKNOWLEDGMENT: EI
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05 172750
TRENDS IN AIRCRAFT LANDING SYSTEMS
This paper describes the present anticipated contributions of two systems of approach and landing guidance--VHF/UHF Instrument Landing System (ILS), and Microwave Landing System (MLS). The first part of the paper is a brief history of aircraft approach and landing guidance. This is followed by a discussion of the large recent improvements in ILS through new engineering developments. Key features of the five national proposals for MLS competing for being identified as the international standard are described along with the most apparent improvements the MLS systems will provide.

IEEE Paper 114 from IEEE Electron and Aerospace System Conv (EASCON '76) Washington, D.C., September 26-29, 1976.

Moore, RA (Westinghouse Defence & Electronic System Center) Cooper, HW Littlepage, RS
Institute of Electrical and Electronics Engineers Proceeding 76CH1154-4 EASCON, 1976, 14 pp, 24 Ref.

ACKNOWLEDGMENT: EI
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05 172751
AIR-DERIVED VS GROUND-DERIVED ATC FUNCTIONS
Even at the current reduced rates of aviation growth, critical parts of the air traffic control (ATC) system will soon be overloaded. About half of all airline delays now occur at only 8 jetports, some will reach saturation by 1982. Thus, the future of the air transport system is closely tied to means for increasing jetport capacity. The technical solutions to achieve these means are mostly electronic in nature. Practical means for increasing ATC capability are discussed. To improve jetport capacity, the pilot must be given tools to work more effectively with the existing ground-derived control system. The objective of these new pilot tools is to allow improved control of air-to-air spacing in dense traffic flow. Increased emphasis is needed on air-derived techniques that are compatible with the current ground-derived ATC system, thus providing pilots comparable tools to those already possessed by ground controllers.

IEEE Paper 35 from IEEE Electron and Aerospace System Conv (EASCON '76) Washington, D.C., September 26-29, 1976.

Litchford, GB (Litchford Electronics Incorporated)
Institute of Electrical and Electronics Engineers Proceeding 76CH1154-4 EASCON, 1976, 7 pp

ACKNOWLEDGMENT: EI
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05 172781
MODERNIZED SSR SYSTEM
The secondary surveillance radar system (SSR), together with primary radar, has been widely employed as a sensor for air traffic control (ATC) according to the ICAO recommendations. For the past several years, ATC automation, involving SSR Mode-C data, has been promoted on a world-wide basis, and the importance of the SSR has been increasing year by year. From this point of view, the technical problems confronting the SSR and their solutions, such as sharp cutoff antenna, monopulse technique, improved SLS (side lobe suppression), beacon target processing, etc., and the standard SSR sensor involving the beacon target extractor applying some of these new techniques are discussed.

Hirashima, Y Koshio, T Takano, H Suzuki, S Okada, K *NEC Research and Development* No. 43, Oct. 1976, pp 59-68, 9 Ref.

ACKNOWLEDGMENT: EI
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05 172814
PROGRAMMING AN AIR TRAFFIC CONTROL SYSTEM
The SARP II Air Traffic Control (ATC) system, which was designed to provide the Amsterdam, Holland, airport with a modern, comprehensive and reliable ATC system, is described. Laid out to cater for future needs, it incorporates advanced philosophies in both hardware and operational software. It has the capability to handle the air traffic over the Netherlands well into the eighties, and ranks, in many respects, among the most advanced ATC systems of the world. After give an outline of the Netherlands airspace structure, sectorization and operational task setting, the article reviews the SARP II hardware. Some aspects of the design, production and testing of the programs are discussed.

van Haaff, FA *PTR--Philips Telecommunication Review* Vol. 35 No. 1, Mar. 1977, pp 1-23, 3 Ref.

ACKNOWLEDGMENT: EI
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05 173489
CLASS OF STABLE ALGORITHMS FOR CONTROL OF CONFLICTION FLOWS ASSOCIATED WITH LANDING OF AIRPLANES [Ob odnom klasse ustoichivykh algoritmov upravleniya konfliktnymi potokami pri posadke samoletov]
The growing air traffic intensity necessitates determining a landing process rational organization for different type airplanes. The consideration of this acute problem leads to a probability-theoretical construction of a nonlinear system model with a variable structure of conflict flow service. An analysis of service systems of this class is outlined. The obtained analysis results in theorems that enable formulating the problem of optimal control for conflict flows according to the condition of a random application minimal mean time of presence in the system and choosing an approximate method of optimization in this problem. As an illustration a problem is solved on a numerical choice of quasi-optimal control for a busy airport operating a number of runways and one airplane landings system. [Russian]

Fedotkin, MA (Gor'kii State University, USSR) *Problems of Control and Information Theory* Vol. 6 No. 1, 1977, pp 17-27, 6 Ref.

ACKNOWLEDGMENT: EI
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05 173490
INSTRUMENT-LANDING-SYSTEM (ILS) SIMULATOR [Ein Instrumenten-Lande-System-Simulator (ILS-Simulator)]
A simple ILS simulator is described which can be used as an instructional aid. Three oscillators produce the 90-Hz and 150-Hz signals for the modulation plus a carrier signal of approximately 100 kHz. This enables display on conventional oscilloscopes. At the receiving end, i.e. the onboard receiver, the receiver and amplifier stages are followed by demodulators for localizer and glide path, the filters necessary for the separation of the modulation components, rectifier stages and finally the combined instrument and the appropriate adjusting stages. [German]

Peters, OH Michaels, R *Elektronik* Vol. 26 No. 3, Mar. 1977, pp 49-52, 5 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

05 173847
SOME MATHEMATICAL ASPECTS OF AIR TRAFFIC SYSTEMS
The application of the theory of queues to air traffic control is discussed, and the importance is noted of random perturbations due to late arrival of aircraft, and how traffic schedules in an airway network can best be adjusted to minimize delays due to congestion on certain routes. The theory of queues is explained and time varying queues are described. The randomness in air traffic systems, the effect of reduction in randomness, and the effect of

randomness on the design of air traffic systems are discussed. Schedule planning and a computer process which demonstrates how a given demand schedule can be smoothed down to a given target flow in an optimum way and also give an indication of the schedule-upset penalty involved is described. An irregular schedule traffic fed into a node where there is a single constraint is discussed as well as a more complex air traffic system with many constraints. The optimization of the system and further improvements are also discussed.

Attwool, VW *Journal of Navigation* Vol. 30 No. 3, Sept. 1977, pp 394-414, Figs.

ACKNOWLEDGMENT: Journal of Navigation
ORDER FROM: Scottish Academic Press Limited, 33 Montgomery Street, Edinburgh EH7 5JX, Scotland

05 174318
DESIGN AND SIMULATION OF MAN-MACHINE SYSTEMS USING NETWORK MODELS
The paper is primarily aimed at investigating the feasibility of providing a computer aid to man-machine system design. An interactive computer aid for designing logical networks representing air-traffic-control systems is described. It is written in CORAL 66, and allows system descriptions to be entered rapidly into the machine without there being a need to know a complex simulation language. By giving suitable responses to prompts, a network description of a proposed system can be generated and displayed on a graphics terminal. The models built up can then be exercized and their performance evaluated. Some current limitations to the use of networks to describe man-machine systems generally are discussed, and ways of usefully extending the work are suggested.

Sherlock, JF *Computer Aided Design* Vol. 9 No. 3, July 1977, pp 151-156, 14 Ref.

ACKNOWLEDGMENT: EI
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05 174572
MONTE CARLO SIMULATION OF VOR/DME HOLDING PROCEDURES. BASIC NOTIONS AND APPLICATIONS
Using DME in addition to VOR allows a better use of the airspace for holding procedures in civil aviation. As yet, there are no procedures agreed on by the international authorities for the construction of the airspace to be reserved for a safe execution of these holding procedures. A method for the construction of holding areas of different probabilities is described in which the simulation of flight paths in a computer using the Monte Carlo technique has special importance. The simulation allows the application of an extensive and detailed error model. In addition, the locally different physical conditions may be taken into consideration. Both factors are most important for safe and economical use of airspace. [German]

Tran-Transl. Into English of 'Grundlagen U. Anwend. Der Simulation von VOR/Dme-Warteverfahren MIT der Monte-Carlo-Tech.', Dfvlr, Brunswick Report Dlr-FB-77-08, 17 Mar. 1977. Misc-Original Report in German Previously Announced as N77-30105. Misc-Original German Report Available from Dfvlr, Cologne Dm 13.70.

Schnuerer, H
European Space Agency, Deutsche Forschungs-u Versuchsanst f Luft-u Raumft ESA-TT-419, Sept. 1977, 29 pp, 9 Ref.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33142/9ST

05 174595
AUTOMATED LANDING, ROLLOUT, AND TURNOFF USING MLS AND MAGNETIC CABLE SENSORS
A description of the simulation program used to study the landing approach, rollout and turnoff of the B737-100 aircraft utilizing MLS and a buried magnetic leader cable as navigation aids is presented. Simulation results are given and show the concept to be both feasible and practical for commercial type aircraft terminal area control.

Pines, S Schmidt, SF Mann, F
Analytical Mechanics Associates, Incorporated Final Rpt. NASA-CR-2907, Oct. 1977, 152 pp

Contract NAS1-14311

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-10042/7ST

05 174887
IFR AIRCRAFT HANDLED FORECAST BY AIR ROUTE TRAFFIC CONTROL CENTER, FISCAL YEARS 1978-1989
The report presents the forecasts of Instrument Flight Rule (IFR) aircraft handled by FAA air route traffic control centers (ARTCC). It serves as a base for the FAA planning and budget process in determining future requirements for facilities, equipment and manpower. The forecasts show that total aircraft handled will increase from 25.7 million in FY 1977 to 41.5 million in FY 1989. These national total numbers along with those for the intervening years are broken down by FAA region and by each air route traffic control center in this report. (Author)

Hannan, B
Federal Aviation Administration FAA-AVP-77-34, Nov. 1977, 48 pp

ACKNOWLEDGMENT: NTIS
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AD-A049305/6ST

05 175021
HIGH DENSITY STABLE COLLISIONLESS AIR TRAFFIC: COMPUTER SIMULATIONS OF TRAFFIC MANAGEMENT IN THE ITV SYSTEM
A system of air transport for the future is considered which envisages automatic operation of very large numbers of small vehicles. These craft will offer the traveller an airborne traverse at 200kt ground speed between air stations very close to the origin and destination of any journey. Computer simulations are presented to demonstrate the manner in which these vehicles can navigate, avoid collisions and preserve the stability of the resulting high density air traffic. The possibility that some of the features described might usefully be adapted to aid collision avoidance in existing air traffic is briefly discussed.

Fitzwilliams, O Yarker, J
Westland Helicopters Limited RP-552, Nov. 1977, 61 pp

ACKNOWLEDGMENT: NTIS
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N78-13033/3ST

05 175367
COCKPIT DISPLAYED TRAFFIC INFORMATION STUDY
The purpose of the Cockpit Displayed Traffic Information (CDTI) study was to provide the planning base for conducting a flight test evaluation of an Electronic Horizontal Situation Indicator (EHSI) incorporating the position of other air traffic as derived from ground sens- -s. Study objectives were to: (1) define and scope a system concept for an airborne information display using ground derived ATC and ATC related information (this concept to be based on measurable potential ATC system benefits that are amenable to experimental verification via simulation and flight tests); and (2) prepare an outline of a simulation and flight test program which includes the NASA 515 aircraft, the Langley Research Center traffic simulation and other aircraft and simulations. Testing in a busy terminal area was also to be planned. The general approach was to review the extensive work of other investigators on the CDTI and related concepts, formulate operational concepts for how various roles could be used in the Upgraded Third Generation ATC system (and in realistic terminal area traffic situations), and identify the simulation and testing necessary to evaluate the performance achievable with CDTI.

Boeing Company Final Rpt. FAA-EM-77-18, D6-42968, Sept. 1977, 249 pp

Contract NAS1-13267

ACKNOWLEDGMENT: NTIS
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AD-A049870/9ST

05 175377
AN ANALYSIS OF CONTINUED OPERATION OF SELECTED AIRPORT TRAFFIC CONTROL TOWERS (ATCT)
This report evaluates the merits of continued operation of existing FAA airport traffic control towers using the benefit-cost technique. Considered are airport safety and efficiency benefits as well as the costs of continued facility operation and of dismantling and relocation. The analysis identifies

73 current tower locations as not worthy of continued operation on economic grounds. Only nine sites are selected as candidates for decommissioning when using existing noneconomic discontinuance criteria. The study is divided into three parts. Part A describes the detailed benefit-cost rationale and methodology. Part B provides an historical account of the evolution of tower establishment and discontinuance criteria. Part C examines the impact of uneconomical tower locations identified by the benefit-cost analysis, i.e., those sites where costs of continued tower operation exceed benefits. This part also offers several alternative options for formulating an agency policy for discontinuing tower operations. (Author)

Zaidman, S
Federal Aviation Administration Draft Rpt. FAA-ASP-77-6, June 1977, 75 pp

ACKNOWLEDGMENT: NTIS
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AD-A049793/3ST

05 175456
POLICY IMPACTS OF ATC AUTOMATION: HUMAN FACTORS CONSIDERATIONS

This report examines the future policy impact implications of advanced air traffic control (ATC) systems which might be developed by the Federal Aviation Administration (FAA). It studies impacts of ATC automation on sector air traffic controllers, with emphasis placed on the identification of human factors problems that may arise in the future if higher levels of automation are implemented. Of particular concern are those human factors that may in some manner determine the direction of automation development or impeded the implementation of automation. Using descriptions of technological components currently proposed by the FAA, six ATC system operations were defined. These systems represent various levels of automation development from the current system to a system in which the human controller acts as a systems data manager. The systems were evaluated in terms of 17 factors describing job satisfaction and motivation, man-machine interface, and failure mode operations in order to identify critical operational characteristics for each system.

Prepared in cooperation with Payne-Maxie Consultants, Berkeley, CA.

Couluris, GJ Tashker, MG Penick, MC
SRI International Final Rpt. FAA-AVP-78-1, Jan. 1978, 144 pp

Contract DOT-FA76WAI-635

ACKNOWLEDGMENT: NTIS
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AD-A051064/4ST

05 175457
VERIFICATION OF DABS SENSOR SURVEILLANCE PERFORMANCE (ATCRBS MODE) AT TYPICAL ASR SITES THROUGHOUT CONUS

A Transportable Measurement Facility (TMF) incorporating antenna, r-f, and reply processing elements of a Discrete Address Beacon System (DABS) sensor has been sited at, and in the vicinity of, several FAA terminal ASR's throughout the United States. Data collected at these sites have been thoroughly analyzed to verify the design of the DABS sensor and to establish the need for design refinements. This report presents the results that pertain to DABS and ATCRBS Mode range and azimuth accuracy and to the total ATCRBS Mode reply processing performance. It is shown that both range and azimuth accuracies for the DABS sensor are a factor of four to five better than those provided by existing ARTS (BI-4) interrogators, and that the average blip/scan ratio is 98% or better, dropping only a few percentage points in crossing track situations. (Author)

Wells, WI
Lincoln Laboratory Proj Rpt. FAA/RD-77/113, ATC-79, Dec. 1977, 52 pp

Contract F19628-78-C-0002

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051128/7ST

05 175459
ENGINEERING AND DEVELOPMENT PROGRAM PLAN-WAKE VORTEX

This Engineering and Development Program Plan defines the current research efforts investigating the wake vortex phenomenon. The overall objectives of the program are the design, development, testing, and prototyping of a system(s) to increase runway capacity by minimizing wake vortex effects as an impediment to efficient and effective traffic management in the terminal environment. The plan identifies and discusses the three major work areas: Vortex Advisory System, Wake Vortex Avoidance System, and Vortex Alleviation Research. Prior developments and related research are reviewed and future research requirements identified. (Author)

Supersedes Rept. No. FAA-ED-21-1 dated Feb 73, AD-760-636.

Federal Aviation Administration FAA-ED-21-1A, Dec. 1977, 67 pp

ACKNOWLEDGMENT: NTIS
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AD-A051143/6ST

05 175468
PROJECT PLAN: TOWER AUTOMATED GROUND SURVEILLANCE SYSTEM DEVELOPMENT PROGRAM

The Tower Automated Ground Surveillance System (TAGS) represents an important step in providing automation support for air traffic controllers in the tower cab. During FY-1978 the objective of the TAGS activity is to perform the necessary analyses and feasibility tests to define the TAGS development program. This mini-plan describes the FY-1978 activity. (Author)

Perie, ME
Federal Aviation Administration FAA-RD-78-4, Jan. 1978, 18 pp

ACKNOWLEDGMENT: NTIS
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AD-A051621/1ST

05 175512
SUMMARY OF AIRLINE DELAY TRENDS 1972-1975

This document is a highlight edition of the Annual Airline Delay Trends Report published since 1974. These reports provide estimates of block, airborne, and ground delays for approximately 325 route segments connecting 20 of the most active U.S. airports, and serviced by 19 major domestic scheduled air carriers. Delay information as presented in this summary edition consists of airborne and ground data for each of the 20 airports in the study, displayed in both table and graph form, for the years 1972 through 1975 for the following categories: (1) Total traffic activity for route segments arriving at each of the 20 airports by "busy" and "dull" time interval ("Busy"-7:00-22:59, "Dull"- 23:00-06:59); (2) Average airborne delays for route segments arriving at each of the 20 airports, by "busy" and "dull" time intervals; and (3) Average ground times and delays for route segments departing and arriving the 20 airports, by "busy" and "dull" time intervals. A table showing the monthly average of airborne arrival delays at a summary airport which represents the total of the 20 study airports is also included. (Author)

See also AD-A039483.

Condell, HM Horowitz, SR
Transportation Systems Center Final Rpt. FAA-EM-77-12, TSC-FAA-77-6-F, Oct. 1977, 61 pp

ACKNOWLEDGMENT: NTIS
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AD-A050960/4ST

05 175537
A STUDY OF THE ECONOMIC IMPACT OF SELECTED COMMUNICATIONS ALTERNATIVES, PRESENT SYSTEM DEFINITION

This report provides a description of the present FAA communications system. The data base described will be incorporated in a communications cost model being developed for the Federal Aviation Administration (FAA) by ARINC Research Corporation. The economic data presented were obtained primarily from three sources: (1) the Aviation Cost Allocation Study Working Paper No. 2 (Office of Policy Review, DOT, 1972) for one-time facilities and equipment (F and E) costs; (2) the Airways Facilities Maintenance Cost Srudy (Project Memorandum: PPA FP-604, 1976) for operation and maintenance (O and M) costs; and (3) the DECCO Circuit File for recurring leased costs. Defining such a comprehensive communications cost data base was complicated by the fact that there is no clear definition within the FAA of what constitutes communications. For the purposes of the present cost-modeling effort, however, it is convenient to classify costs into two groups: (1) traditional FAA communications services,

including Air/Ground, Ground/Ground, Remote Link, Weather Net, AFTN, Service B, Computer B, and a miscellaneous category of additional communications functions; and (2) services in which some (incidental) communications is required for the functioning of basic FAA systems, viz., air traffic control, surveillance, and navigation.

Woodie, P Kolb, W
ARINC Research Corporation 1339-01-1-1723, Mar. 1978, 48 pp

Contract DOT-FAA77WA-4018

ACKNOWLEDGMENT: NTIS
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AD-A052162/5ST

05 175961
LAS VEGAS GRAPHIC STUDY
A graphic study was conducted by the National Aviation Facilities Experimental Center (NAFEC) to develop and evaluate a number of new procedural plans for the control of air traffic operating within the Las Vegas terminal area. A plan was also developed for a "head-on" type departure/arrival operation for Nellis Air Force Base (AFB). A controller opinion questionnaire was developed around factors that comprise elements of air traffic control that take into consideration the users, controllers, and the area. Each plan was evaluated by a panel of 14 air traffic control specialists. The new plans for the terminal area, along with the present operating procedures, were evaluated for each of four directions of operation or runway configurations and then statistically compared with each other. The "head-on" plan for Nellis AFB was likewise evaluated, and results from the questionnaires statistically compared with present operating procedures at Nellis AFB. The results of the evaluation indicate that, overall, plans 1 and 2 were significantly preferred over the present system and plan 2 was also significantly preferred over plan 1. The present system at Nellis AFB was significantly preferred over plan 3 (Head-On Procedures). Basic reasons for the raters' choice of the Nellis present system over the head-on procedure were safety, complexity of operation, controller workload, and adverse effects to missions at Nellis due to delays. (Author)

Maurer, JJ Misiewicz, VJ Tack, RW
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-182, FAA-NA-77-27, Jan. 1978, 130 pp

ACKNOWLEDGMENT: NTIS
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AD-A052772/1ST

05 175964
MICROPROCESSOR-CONTROLLED COMMUNICATIONS IN AIR TERMINAL NAVIGATION SYSTEMS
This report documents the implementation of some old and new techniques to the problem of command-and-control signaling within a Category III instrument landing system. The old techniques include the use of tone signaling over balanced lines, along with isolation transformers and gas-discharge elements for lightning protection. The new methods include the application of microprocessor control devices to supervise, format, and interpret all communications. Additional features afforded by the microprocessor approach include automatic and manual maintenance logging at the control tower, more reliable transmission error detection, enhanced system status displays, and a self-contained operator training feature. (Author)

Belter, SE Williams, CR Bass, SC
Purdue University Final Rpt. FAA-RD-78-25, Jan. 1978, 182 pp

Contract DOT-FA-74WA-3518

ACKNOWLEDGMENT: NTIS
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AD-A052819/0ST

05 176074
STUDY OF TRAFFIC PACKING OVER THE NORTH ATLANTIC
This report updates the work first carried out by P.P. Scott on North Atlantic data for 1967-data for 1973 is now examined. Relationships are found between the number of flights in a day and measures of the occupancies of the tracks and flight levels which are adjacent to those of a "typical" aircraft. These results are used to contruct a flight request pattern required as input data to a simulation model which forecasts the density with which aircraft will be packed into the North Atlantic track system as the traffic flow increases in future years. Repeated runs of the model with a series of traffic flow rates have enabled the packing density to be expressed as a function of traffic intensity. (Author)

Sheil, RS
Royal Aircraft Establishment Tech Memo RAE-TM-MATH-7703, DRTC-BR-59796, July 1977, 38 pp

ACKNOWLEDGMENT: NTIS
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AD-A051956/1ST

05 176216
IMPACT OF FAA E AND D ELEMENTS--EIGHT AIRPORT SUMMARY. VOLUME 8
The potential benefits of implementing the products of selected FAA Engineering and Development Programs at eight major airports are surveyed. Best estimates of the expected performance of the Vortex Advisory/Wake Vortex Avoidance Systems (VAS/WVAS), Metering and Spacing (M and S--part of the ATC System Automation program) and the Discrete Address Beacon System are used as basis for estimating the increase in airport capacity that might be realized from the collective use of those systems in a pre-1985 case and a post-1985 case. Best estimates of the expected performance of the Airport Surface Traffic Control (ASTC) system, the Microwave Landing System (MLS), and Area Navigation Equipment (RNAV) plus results of recent FAA/TSC studies are used as the basis for estimating the individual impacts of those systems on controller workload, changes in air routes to reduce time and fuel, and ILS interference problems at the eight airports. This report summarizes the potential benefits. (Author)

Haines, AL
Mitre Corporation Final Rpt. FAA-EM-78-4-Vol8, MTR-7350-Vol8, Jan. 1978, 71 pp

Contract DOT-FA78WA-4075

ACKNOWLEDGMENT: NTIS
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AD-A054245/6ST

05 176273
AVIONICS COST DEVELOPMENT FOR ALTERNATIVES OF SELECTED AIR TRAFFIC CONTROL SYSTEMS
This report presents the results of the cost analysis of avionics required in support of the Upgraded Third Generation Air Traffic Control developments. The systems considered were recommended for evaluation by the Office of Systems Engineering Management of the FAA. The costs of avionics were developed with the aid of a pricing model to provide comparative evaluations based on uniform parametric data varying only in system-peculiar descriptors. (Author)

Kowalski, SH
ARINC Research Corporation Final Rpt. 1326-01-3-1758, Oct. 1977, 69 pp

Contract DOT-FA76WA-3788

ACKNOWLEDGMENT: NTIS
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AD-A054823/0ST

05 176639
ANALYSIS OF SIMULATION-GENERATED RESPONSES USING AUTOREGRESSIVE MODELS
A testing procedure is suggested for comparing historical time series records against responses generated by a simulation model. Time series models are identified and their parameters estimated for both the historical and simulated data. The models are then tested for differences in their means, autoregressive parameters, and residual variances employing Bayesian arguments. The procedure suggested is emphasized as a diagnostic instrument useful for validation, and for suggesting iterative modifications of a simulation model. Applications of the procedure are illustrated by an example involving air traffic control communications.

Hsu, DA (Princeton University) Hunter, JS *Management Science* Vol. 24 No. 2, Oct. 1977, pp 181-190, 16 Ref.

ACKNOWLEDGMENT: EI
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05 176647
FLIGHT EVALUATION OF FLIGHT-PATH CONTROL FOR THE STOL APPROACH AND LANDING
Flight experiments have been conducted to assess requirements for flight-path control for glide-slope tracking and for control of the flare and landing, particularly as applied to powered-lift STOL aircraft. The research aircraft used to perform landing approaches on a 7. 5-deg glide slope to landings on a 30 X 518 m (100 X 1700 ft) STOL runway provided the capability for evaluating a wide range of flight-path control characteristics. The flight results identified flight-path overshoot, flight-path/airspeed coupling, and vertical velocity damping to be the dominant aircraft response characteristics that affect glide-slope tracking. The one prominent contribution to control of flare using pitch attitude was the short-term response. Specific design considerations for the effective thrust turning of the high-lift system, thrust response lags of the engines, and the aircraft loading and operating conditions are discussed.

Franklin, JA (Ames Research Center) Innis, RC *Journal of Aircraft* Vol. 15 No. 1, Jan. 1978, pp 5-12, 16 Ref.

ACKNOWLEDGMENT: EI
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05 177024
STANDARD DATA ELEMENTS AND CODES: GENERAL STANDARDS
No Abstract.

Federal Aviation Administration Mar. 1977, 46 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

FAA 1375.2

05 177433
IMPLEMENTATION OF THE DISCRETE ADDRESS BEACON SYSTEM (DABS) SENSOR
To alleviate many of the problems encountered by existing Air Traffic Control Radar Beacons (ATCRBS), an interoperabie discrete-address beacon system concept is under development. A summary is presented of the basic function of the DABS equipment, the principal functional requirements for the major subsystems, and implementation approaches. Particular emphasis is placed on the modular, distributed computer system and its associated software.

IEEE Proceeding of the National Aerospace Electron Conference, NAECON '77, Dayton, Ohio, May 17-19, 1977.

Lockherd, RM (Texas Instruments Incorporated)
Institute of Electrical and Electronics Engineers Proceeding 77CH1203-9 NAECON, 1977, pp 713-722

ACKNOWLEDGMENT: EI
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05 177447
ATC: THE HUMAN ELEMENT
This article describes how air traffic controllers use the equipment at their disposal and the general operating procedures of the tower and ATC center. Also, a scheduled flight, from takeoff to landing, is described to show how the ATC system handled them on their 5,000 non-stop polar sector. Requirements for air traffic controllers are discussed and it is noted that they are mainly assessed on their educational background, aptitude and personality. The operations of three distinct teams in the tower are described, they are the ground movement planning control team, ground movement control, and the air departure (runway control) team. Also in the tower, but distinctly separated from the three teams, is the approach control team which uses radar displays to sort out aircraft arriving from various directions and puts them in an orderly sequence. A brief description of the airline's flight planning department, is given as their decisions ultimately affect the ATC organizatons which control the aircraft enroute. The ATC computer's main function, it is concluded, is to relieve crews and controllers of monotonous routine work. They provide rapid answers and can address the effects of more alternative decisions than could a human controller. But the final decision about an aircrafts safety is ultimately made by a controller.

Hirst, M *Flight International* Vol. 113 No. 3609, May 1978, p 1439

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

05 178067
THE STRATEGY OF TRAFFIC REGULATION IN WESTERN EUROPE
This paper first discusses methods of increasing the capacity of terminal aerodromes and of the en-route system to reduce the need for special flow regulation procedures. The paper then considers the principles which should be applied in flow regulation planning in the Western European area, the ATC implementation procedures which need to be introduced and the machinery required both to develop and implement flow regulation planning and ATC procedures.

Controller Vol. 17 No. 1, Feb. 1978, pp 7-16

ACKNOWLEDGMENT: Controller
ORDER FROM: International Fed Air Traffic Controllers' Assoc, P.O. Box 196, CH-1215 Geneva, Switzerland

05 178068
BY ACCIDENT OR DESIGN
Cost and not technology is the constraint upon improved in flight collision avoidance. The risks of collision stem mainly from the diverse roles and motivations of the many users of the airspace. Even formal ATC techniques of procedural and radar control prove inadequate in particular circumstances. Improvement should be by evolution and not revolution but could include air interpreted aids to supplement but not to usurp the role of ATC. Techniques of analysis, prediction and fast time simulation, offer the possibility of identifying and reducing the possibility of in-flight collision and of providing guidelines to most effectively deploy our technical and economic resources. /Author/

Controller Vol. 17 No. 1, Feb. 1978, pp 19-22

ACKNOWLEDGMENT: Controller
ORDER FROM: International Fed Air Traffic Controllers' Assoc, P.O. Box 196, CH-1215 Geneva, Switzerland

05 178256
PERFORMANCE MEASUREMENT SYSTEM FOR MAJOR AIRPORTS
The objective of the Performance Measurement System (PMS) development effort is to develop a system to routinely evaluate ATC system performance at major terminals where user demand pushes airport capacity. The PMS development effort was undertaken to establish capacity standards and the appropriate mechanicsms for measuring airport performance. These capacity standards, which are called Engineered Performance Standards (EPS's) serve as the basis for calculating hourly airport performance indexes (P.I.'s) and for determining what factors inhibit airport capacity and encourage delays in the airport area. A PMS based on EPS's can highlight what problems are occuring and their effect on system performance. Ultimately, analyses from the PMS are used to identify the actions that are reguired to improve system performance. A summary of the EPS's set to date by configuration and weather condition is presented in tabular form. Also included in this report are chapters on the methodology, PMS implementation, and airports selected for PMS application.

Federal Aviation Administration Nov. 1975, 267 pp, Figs., Tabs.

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: GPO

05 178479
AIRTRACK, AN AIR TRAFFIC CONTROL SYSTEM [Airtrack, ein System fuer die Glugverkehrskontrolle]
A new air traffic control system is described which offers individual solution possibilities for a variety of flight security problems. Apart from the system philosophy, the paper discusses the components such as primary radar, secondary radar, video extractors, processors and video equipment. In addition, the corresponding software is specified. [German]

Mueck, G *Technische Mitteilungen AEG-Telefunken* Vol. 67 No. 2, 1977, pp 113-115

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

05 179300
SST FLIGHT PLANNING AND NAVIGATION: THE FIRST YEAR'S EXPERIENCE
This paper examines the Concorde's operations in the light of experience, with emphasis on navigation and operational planning. Of special interest is the way in which the triple intertial navigation system on the aircraft has been used to ensure accurate and reliable track keeping on complex routes. It is noted that Concorde routes are constrained as much by political as by operational considerations and long term planning was necessary to obtain route profiles which gave the shortest distance and optimum acceleration/deceleration points. The London-Bahrain route involves subsonic flying over Europe with supersonic climb cruise over the Adriatic and Mediterranean Seas and over sparsely populated desert areas of the Middle East. The basic INS fit which has a "turn anticipation" distance of about 40 n.m at Mach 2 is described and its associated advantages and disadvantages are discussed. One of the advantages of the INS is its ability to bend a route with the minimum increase in track mileage. The false waypoint technique is described with respect to this particular route. The transatlantic London-Washington route revealed that a variable SST track system over the Atlantic had no advantage over a fixed track system. Acceleration and deceleration is constrained at both ends of the route. The application of false way points to particular problems associated with this route are included. The application of the INS approach on the return sector of the Atlantic operation is described.

Guest, TCR (British Airways) *Journal of Navigation* Vol. 31 No. 2, May 1978, pp 250-258

ACKNOWLEDGMENT: Journal of Navigation
ORDER FROM: Scottish Academic Press, 33 Montgomery Street, Edinburgh EH7 5JX, Scotland

05 179301
FULLY-AUTOMATED, PILOT-MONITORED AIR TRAFFIC CONTROL
This paper suggests a possible solution to the problem of air traffic control systems, with the aims of economy and flexibility in mind. A review of the broad spectrum of possible systems is included before discussing the Fully Automated Pilot Monitored, Air Traffic Control system (FAPMATC). Characteristics of FAPMATC include an emphasis on strategic planning and control techniques; ground-based surveillance and two-way digital communication; electronic traffic situation displays to pilots; and, re-design of flight-deck instrument. The logical argument for this system is that the optimum amount of strategic planning and control will maximize the efficiency of aircraft operations and minimize the amount of tactical intervention required. It is argued that the switch to total automation on the ground is the only satisfactory way to deal with the problem of controller productivity. The FAPMATC system is strategically oriented to require a minimum of tactical control. The ground-based part of the system for surveillance, communication, strategic and tactical control being fully automated; the human monitoring element required to provide confidence in the system is supplied from the flight deck. It is suggested that the FAPMATC system is both the logical conclusion is present trends in the development of air traffic management (ATM) systems and a system which results from a reasoned approach to the solution of the ATM problem, given the constraints of economy in operation and flexibility with respect to traffic growth.

Ford, RL (Royal Signals and Radar Establishment, England) *Journal of Navigation* Vol. 31 No. 2, May 1978, pp 259-267, 2 Fig., 4 Ref.

ACKNOWLEDGMENT: Journal of Navigation
ORDER FROM: Scottish Academic Press, 33 Montgomery Street, Edinburgh EH7 5JX, Scotland

05 179393
THE WELL DISCIPLINED APPROACH
In all of the U.S. approach accidents both types of instrument approach-precision and non-precision-were involved. In a precision approach the pilot uses an ILS and Vertical (height) guidance from an electronic glidepath. The approach is flown to a predetermined Decision Height (DH). In a non-precision approach, no electronic glidepath is available. Azimuth information may be obtained from an ILS localiser, a radio beacon or a ground radar. Non-precision approaches are sometimes necessary at airfields where an electronic glideslope is either topographically or economically impracticable. The 17 approach accidents which happened over six years have been studied by the U.S. NTSB. The importance of distinguishing between the Pilot Flying (PF) and the Pilot Not Flying (PNF) as it relates to approach accidents is discussed. Airlines establish their own procedures as to who shall fly the aircraft on instruments and who shall monitor and watch for the lights. All procedures are designed to ensure that the PF is monitored and warned if the aircraft departs from its flightpath. Nearly all airlines encourage their captainsto "play" co-pilot in good weather. Such role swapping widens the experience of the co-pilot. Role swapping also develops the relationship between pilot and co-pilot so that the challenging of the former by the latter is accepted as normal. The captain-monitored approach is discussed and it is noted that this approach, by freeing the captain to attend more to the management than to the manual aspects of the operation, will in the future be bringing more and more airlines safely down to land.

Ramsder, JM *Flight International* Vol. 114 No. 3617, July 1978, pp 219-222

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

05 179854
AIR TRAFFIC CONTROL
This report provides an overview of the air traffic control facilities available in the UK and examines some of the trends in this field. Also, a brief description of the early history of air traffic control is presented. Controlled airspace, quadrantal rule, semi-synthetic displays, military control, and airspace policy are described. For emergency situations, the Distress and Diversion (D&D) call at the London Air Traffic Control Center (LATCC) offers round-the-clock surveillance of all traffic in the London Flight Information Region (FIR). A discussion on the College of Air Traffic Control is presented and it is noted that the college provides both a first rate training ground for the highly regarded British ATCO, and a valuable source of foreign exchange. The Air Traffic Control Evaluation Unit (ATCEU) is called upon to evaluate and develop techniques and equipment for future air traffic systems; to develop methods of control to cope with the increasing air traffic density; check radar installations; and collect and analyze data concerning aircraft operations. It is noted that civil aviation authorities are becoming more aware that simulation can be used to train far better than classroom and control-tower combination. A brief discussion on the ground-based secondary surveillance radar (SSR) is presented. Lastly, the use of an IBM 9020 computer system for en-route air traffic control at the LATCC is discussed.

Broadbent, S Vass, L *Flight International* June 1976, 7 pp

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

05 180156
MONITORING OF AIRCRAFT WAKE VORTICES AT HEATHROW AIRPORT
Aircraft separation to avert entrainment in wake vortices is weighed against loss of traffic capacity at airports, and meteorological conditions unfavorable to the formation of wake vortices and their attendant hazards are examined; the organization of vortex data collection sites is discussed. Experience with vortex data collection sites at London, New York, and Denver is surveyed. Anemometer baselines and an acoustic doppler system are described. Delineation of safety zones and determination of the rate at which shed vortices leave the safety zone are discussed.
From the International Conference on the Future of Aircraft All-Weather Operations, London, England, 23-26 November 1976. (A77-37701 17-04)

Hallock, JN (Department of Transportation) Goldstone, L Nevill, RG (Civil Aviation Authority, England) Cooper, DC (Birmingham University, England)
Institution of Electrical Engineers Proceeding 1976, pp 38-41

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-37711)
ORDER FROM: AIAA

A77-37711

05 180178
FUEL CONSERVATION FOR HIGH PERFORMANCE AIRCRAFT IN THE TERMINAL AREA
In a high density terminal area, speed control and radar vectoring are typically used to optimize the sequence and assure the spacing of landing

aircraft for maximum runway utilization. The paper describes an approach for the air traffic control (ATC) system in the terminal area to accommodate fuel conserving landing approaches. Analytical results are presented that illustrate the impact of fuel economic design on terminal controllability and airport capacity. Peak hour trade-offs between conserving fuel and maximizing runway utilization are also included in the paper. An analytical fuel consumption model is used to estimate the fuel benefits of lifting the 250 knots speed restriction below 10,000 ft mean sea level (MSL), for both arrivals and departures.

Mohleji, SC (Mitre Corporation)
Institute of Navigation Proceeding 1977, pp 43-46

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-44434)
ORDER FROM: AIAA

A77-44434

05 180417
SIMULATION OF TRAFFIC LOAD FOR APPROACH AND LANDING SYSTEMS WITH STATISTICAL INTERROGATIONS [Simulation der Verkehrsbelastung bei Anflug-und Landsystemen mit Statistischer Abfrage]
When an approach and landing system with statistical interrogations is measured, the entire air traffic that influences system reply efficiency and accuracy has to be considered. This traffic load is simulated by statistical generators. In this article the development of suitable simulation equipment based on a traffic model is described. The suitability of the equipment is demonstrated by means of some measuring results gained from test measurements with the microwave landing system DLS developed in West Germany. [German]

Skupin, W (Technical University of Braunschweig, West Germany) Ullrich, R *Frequenz* Vol. 31 No. 8, Aug. 1977, pp 246-253, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

05 180419
PRECISION DME FOR NEW LANDING SYSTEM: FAST OR SLOW PULSE?
Recent proposals for the new precision distance measuring equipment to be collocated with the proposed microwave landing system are based on two main techniques: the fast and slow pulse. This paper analyzes the factors involved in using both these techniques and compares the anticipated costs. Comparison shows that the fast pulse method will probably have technical and economic advantages over the slow pulse technique.

Graziani, D *Electrical Communication* Vol. 52 No. 4, 1977, pp 289-292, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

05 180488
AIR TRAFFIC SAFETY IN THE AIRPORT NEAR RANGE [Beitraege zur verkehrssicherung im flughafen-nahbereich]
No Abstract. [German]

Technical University of Brunswick, West Germany TUBS/SFB58/M4, Mar. 1977, 106 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-20103/5ST

05 180756
FAA AIR TRAFFIC ACTIVITY, FISCAL YEAR 1977
This report furnishes terminal and enroute air traffic activity information of the National Airspace System. The data have been reported by the FAA-operated Airport Traffic Control Towers (ATCTs), Air Route Traffic Control Centers (ARTCCs), Flight Service Stations (FSSs), Combined Station Towers (CS/Ts), International Flight Service Stations (IFSSs), and Approach Control Facilities. (Author)

Wilson, P
Federal Aviation Administration Sept. 1977, 237 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052403/3ST

06 154891
AIRPORT QUOTAS AND PEAK HOUR PRICING: THEORY AND PRACTICE
This report examines the leading theoretical studies not only of airport peak-hour pricing but also of the congestion costs associated with airport delays and presents a consistent formulation of both. The report also considers purely administrative measures, such as quotas, and hybrid systems which combine administrative and economic control techniques. These are all compared to the real-world situation and problems of implementation discussed. The actual experiences of the Port Authority of New York and New Jersey at the three major New York area airports and the British Airports Authority at Heathrow are then presented. Both organizations administer hybrid quota/peak-hour pricing systems in conjunction with their respective air traffic control authorities. Their experience is compared with the theoretical analyses. (Author)

Odoni, AR Vittek, JF
Federal Aviation Administration Final Rpt. FAA-AVP-77-5, May 1976, 92 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A036773/0ST

06 167193
THE POTENTIAL FOR HELICOPTER PASSENGER SERVICE IN MAJOR URBAN AREAS
An interurban helicopter cost model having the capability of selecting an efficient helicopter network for a given city in terms of service and total operating costs was developed. This model which is based upon the relationship between total and direct operating costs and the number of block hours of helicopter operation is compiled in terms of a computer program which simulates the operation of an intracity helicopter fleet over a given network. When applied to specific urban areas, the model produces results in terms of a break-even air passenger market penetration rate, which is the percent of the air travelers in each of those areas that must patronize the helicopter network to make it break even commercially. A total of twenty major metropolitan areas are analyzed and are ranked initially according to cost per seat mile and then according to break-even penetration rate.

Dajani, JS Stortstrom, RG Warner, DB
Duke University NASA-CR-145224, Mar. 1977, 94 pp

Grant NSG-1121

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
N77-27087/4ST

06 167489
THE DYNAMICS OF THE CIVIL AVIATION INDUSTRY
The following topics are included in this report: Examination of the industry's structure; A model of the civil aviation industry; Theoretical models of passenger demand; Estimation techniques and results of demand models; Capital stock measure; Aircraft orders; The used aircraft market; Aircraft order-delivery lag; Overall model.

Ellison, AP (Queen Mary College, England) Stafford, EM (Southampton University, England)
Heath Lexington Books 1974, n.p.

ORDER FROM: Heath Lexington Books, Heath (DC) and Company, Lexington, Massachusetts, 02173

06 167517
INTERCITY FREIGHT FUEL UTILIZATION AT LOW PACKAGE DENSITIES-AIRPLANES, EXPRESS TRAINS AND TRUCKS
This report provides a comprehensive air energy usage data for low package densities. It is emphasized that all modes do not compete in all markets and indeed modes are complementary. Mode selection varies with the specifics of each transportation requirement: trip length, market size, transport time, commodity characteristics, etc. The major objective of this paper is to explore the relationship between energy conservation and value of transportation. Several aspects of modal energy analysis are examined, including the impact of freight density on modal trip energy comparison. Only the operational energy consumption data are analysed. The paper concludes: at average air freight density, typical express trains and typical trucks are respectively 7 and 4 times more fuel efficient than air freighters; because of the significant quantities of freight carried in the bellies of passenger airplanes, air freighters do not necessarily represent a correct base for air cargo; the latter depends upon the passenger airplane trip fuel allocation technique. The results presented in this report are markedly different from those found in published analysis which ignore the characteristics of the markets served by each mode. The author also expounds upon the fact that because of unavailability of good data here, fair energy comparisons have been difficult.

Proceedings of the Third National Conference (Conf-760895), Effects of Energy Constraints on Transportation Systems, Union College, Schenectady, New York, August 2-6, 1976.

Miller, MP (Boeing Company)
Department of Energy May 1977, pp 269-296, 20 Fig., 4 Tab., 25 Ref.

ACKNOWLEDGMENT: Energy Research and Development Administration
ORDER FROM: GPO
GPO 060-000-00073-5

06 167518
ENERGY EFFICIENCY OF CURRENT INTERCITY PASSENGER TRANSPORTATION MODES
A detailed study was conducted to compare three public modes (aircraft, train, and bus) and one private mode of transportation (automobile). The comparison represented Spring 1974 conditions and was conducted in two parts. During the first part, basic energy efficiency data were collected or developed for each mode. For the second, these data were applied to passenger transportation between 10 city pairs. These results were extended using national system trends to obtain a comparison for the total city pair population. Results from the study are presented and the importance of establishing clear ground rules to ensure fair comparisons through consistent data is emphasized. Many earlier papers show deficiencies in this respect. Some of these deficiencies will be specifically pointed out in order to explain why this paper's results differ from those of previous papers.

Proceedings of the Third National Conference (Conf-760895), Effects of Energy Constraints on Transportation Systems, Union College, Schenectady, New York, August 2-6, 1976. In addition, this paper was first published by the American Institute of Aeronautics and Astronautics as part of the proceedings of the 1975 annual meeting.

Miller, MP (Boeing Company)
Department of Energy May 1977, pp 245-268, 23 Fig., 3 Tab., 26 Ref.

ACKNOWLEDGMENT: Energy Research and Development Administration
ORDER FROM: GPO
GPO 060-000-00073-5

06 167981
DETERMINING COST VS. TIME PARETO-OPTIMAL FRONTIERS IN MULTI-MODAL TRANSPORTATION PROBLEMS
This paper provides a framework for choosing modes of transportation (rail, highway, and air) by taking into account the conflicting objectives of minimizing total transportation costs and average shipment times. An efficient algorithm using the operator theory of parametric programming is presented for determining the Pareto-optimal or efficient curve denoting the minimum attainable value for the second objective for differing values of the first objective. The algorithm also provides the optimal routes, modes of transportation, and the corresponding shipping amounts for every efficient point.

Srinivasan, V (Stanford University) Thompson, GL *Transportation Science* Vol. 11 No. 1, Feb. 1977, pp 1-19, 8 Ref.

ACKNOWLEDGMENT: EI
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06 169066
A STUDY OF COMMUTER AIRLINE ECONOMICS
Variables are defined and cost relationships developed that describe the direct and indirect operating costs of commuter airlines. The study focused on costs for new aircraft and new aircraft technology when applied to the commuter airline industry. With proper judgement and selection of input variables, the operating costs model was shown to be capable of providing economic insight into other commuter airline system evaluations.

Summerfield, JR
Summerfield Associates Final Rpt. NASA-CR-152035, Dec. 1976, 24 pp

Contract NASA ORDER A-29917-B

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-29114/4ST

06 169231
ASSESSMENT OF USER CHARGE IMPACTS ON CIVIL AVIATION ACTIVITIES
The study's objective is to estimate the utilization, diversion, and cost impacts of various user taxes, such as different landing fees, increased fuel taxes, and flight service station charges. To do this a model of cost impacts, a model of aviation activity utilization, a model of airport activity shares, and estimates of air carriers' demand elasticities as functions of cost increases were all developed and then utilized to permit estimates of the different effects due to user charges. The somewhat complex details of these various models are described in the main text of this report. Since air carriers are presently covering a high share of the costs attributable to them, any imposition of user charges required to bring 100% cost recovery is likely to have negligible effects on both air carrier activity and assignable system costs. The bulk of the study concentrated on the various user charge impacts on general aviation, since its deficit against attributable system costs is largest. The broad conclusion from the study is that the levels and ranges of user charges considered here do not appear to brook very large in the cost functions of general aviation activity; therefore, they show relatively small effects on activities, revenues, and costs. (Portions of this document are not fully legible)

RMC Research Corporation, Office of the Secretary of Transportation Final Rpt. DOT-TPI-70-77-15, RMC-UR-249, Aug. 1974, 221 pp

Contract DOT-OS-40024

ACKNOWLEDGMENT: NTIS
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PB-274839/0ST

06 169983
COMPARISON OF COST FUNCTIONS IN MODAL-SPLIT MODELS
Using the entropy trip distribution of Wilson as a base, an intercity bimodal-split model was developed based on the generalized cost of travel. Two variants of the model were calibrated and compared against rail and air domestic intercity travel data in the United Kingdom: one using a linear generalized cost function and the other a nonlinear generalized cost function. These were used to predict the modal share for changes in intercity travel times and frequencies that have taken place, and the predicted values compared with actual results. No significant differences were found between the two model variants. It is concluded that for the domestic intercity situation investigated, there is no significant advantage to be gained by departing from the conventional linear generalized cost function.

Underwood, JR (West Indies University, Trinidad) Leake, GR *ASCE Journal of Transportation Engineering* Vol. 103 No. 6, Nov. 1977, pp 763-772, 9 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 170839
FACTORS INFLUENCING OPERATING COST IN THE AIRLINE INDUSTRY
This study uses path and regression analysis to determine the relationship between operating conditions and operating costs in the United States domestic airline industry. The analysts uses data from eleven trunk and nine local service airlines involved in domestic operations in 1967 and 1968. Two categoreis of variables, network variables and technology variables are defined in an attempt to quantify a variety of aspects of each carriers operations, and the influence of these variables on unit cost and to some extent on size are considered.

Sarndal, C Statton, W (British Columbia University) *Journal of Transport Economics and Policy* Vol. 9 No. 1, Jan. 1975, pp 67-88, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

06 170840
AN OPTIMAL PRICING POLICY FOR SCHEDULED AIR CARRIERS OVER THE NORTH ATLANTIC
The economic impact of the present system of international airline fare regulations of both consumers and carriers is analysed. Direct and indirect operating cost functions are derived for carriers operating on the North Atlantic route. It is concluded that the present structure is not optimal and leads to a misallocation of resources. Alternative pricing structures are suggested and assessed.

Bonsor, N Lakehead, U *Logistics and Transportation Review* Vol. 10 No. 3, 1974, pp 227-239, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: British Columbia University, Canada, Vancouver V6T 1W5, British Columbia, Canada

06 170841
WHAT KILLED THE GOOSE: DECLINE OF NORTH ATLANTIC AIR PROFITS
The decline in profits from air traffic operations over the North Atlantic is discussed. Factors contributing to the decline are identified and recommendations are made for controlling the numbers of new carriers, controlling charter flight prices, reaching bilateral agreements on capacity, increasing fares and eliminating low fares, and for new cost related fare structures and product developments to be introduced. An alternative approach based on subsidies is also considered.

O'Riain, M *Chartered Institute of Transport Journal* Vol. 36 No. 9, Mar. 1975, pp 212-215

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

06 170849
ECONOMIC REGULATION OF DOMESTIC AIR TRANSPORT. THEORY AND PRACTICE
Short historical summary of regulations of U.S. domestic airlines. Examination of the present status of regulations. Establishment of a model describing how air transportation is operating under these regulations. Using this model a comparison is made of air transportation as it is against what it would be if economic efficacy was its aim and driving force. A critique of tariffs, pricing and regulations is made. Suggestions for better returns are given.

Douglas, G Miller, J, III
Brookings Institution 1974, 210 pp, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Brookings Institution, 1775 Massachusetts Avenue, NW, Washington, D.C., 20036

06 170851
THE JUNGLE OF INTERNATIONAL AIR FARES
This paper examines the motivations which led to the adoption of so many different fare categories as exist at present and analyses the relation between pricing policies and the economic difficulties currently faced by the international airline industry. Particular reference is made to North Atlantic routes, a key market in which many fare innovations have been made. The author suggests that many of the promotional fares should be replaced with differentials more closely related to variations in operating cost.

Hanlon, J (Birmingham University, England) *Transport Management* Vol. 9 No. 6, Dec. 1975, n.p., Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Transport Management Limited, 93-94 Chancery Lane, London WC2, England

06 170856
UNCERTAINTIES IN AIRPORT COST ANALYSIS
The results from the cost and demand studies are used as input to a simulation model to analyse the combined effect of the uncertainties involved and gives as output information about incertainty distributions for demand, time of implementation for the different airport projects and the resulting costs and net present values for different interest rates. The methods developed, are applied to the problem of location of new major airport in the Oslo region in Norway.
Direct requests to C. Berkowitz.

Knudsen, T (Trondheim University, Norway)
World Conference on Transport Research Apr. 1977, 53 pp

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: MAUDEP, P.O. Box 722, Church Street Station, New York, New York, 10008

06 172711
AIRPORT AIRCRAFT ECONOMIC INTERFACE
Aircraft operators experience excessive operating costs and fuel consumption when moving airplanes from ramp of departure to ramp of arrival. Approximately 85-90% of such off-to-on delays are attributable to congestion in the terminal airspace/airport at the destination. Economic penalties and causal factors are described. Increased airport productivity is essential and recommendations for improving airport utilization are provided.
Prepared for SAE Meeting, May 10-12, 1977.

Smith, JD (United Air Lines Incorporated)
Society of Automotive Engineers Preprint SAE 770580, 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 172734
TRANSPORT STUDIES RESEARCH IN U. K. UNIVERSITIES
This paper defines transport studies as the scientific discipline underlying the professional practice concerned with the movement of goods and people and with the social, economic and environmental effects of such movement.

Heggie, I (Oxford University, England) *Transportation (Netherlands)* Vol. 6 No. 1, Mar. 1977, pp 19-44, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 172787
CHALLENGE TO ADVANCED TECHNOLOGY TRANSPORT AIRCRAFT SYSTEMS
From the point of view of providing a potential for improved economic performance, six areas of advancing technology are particularly significant: supercritical aerodynamics, friction drag reduction, induced drag reduction, active controls, composite materials, and improved specific fuel consumption. Some potential solutions for future all-new advanced technology transport systems are examined.

Cleveland, FA (Lockheed Aircraft Corporation) *Journal of Aircraft* Vol. 13 No. 10, Oct. 1976, n.p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 172793
FIXED-RANGE OPTIMUM TRAJECTORIES FOR SHORT-HAUL AIRCRAFT
An algorithm based on the energy state method is derived for calculating optimum trajectories with a range constraint. The derivation of the algorithm further assumes that each optimum profile consists of at most three segments, namely, increasing (climb), constant (cruise) and decreasing (descent) segments of energy. This assumption yields significant advantages in the computation of the optimum trajectories. The algorithm is used to compute minimum fuel, minimum time, and minimum direct operating cost trajectories for a currently in service CTOL short-haul aircraft. Minimum fuel trajectories also are computed under conditions of wind velocities and shears of the type encountered in jet streams. Important differences in these trajectories from the no-wind case are noted.

Barman, JF (Ames Research Center) Erzberger, H *Journal of Aircraft* Vol. 13 No. 10, Oct. 1976, n.p.

ACKNOWLEDGMENT: EI (EIX770400288)
ORDER FROM: ESL

06 173475
FORMULATION OF IOWA STATE AIRPORT SYSTEM
An adaptation of the map method was used to identify general aviation airports appropriate for inclusion in the Iowa State Airport System. In this analysis, direct economic benefits were compared with capital costs of development for each airport as an incremental addition to the system. Economic benefits were calculated based on operating cost and travel time savings to candidate airports, if these were developed to system standards, rather than to more distant airports. Additional airports were included in order to increase geographical coverage, although the total system retained a favorable relationship between benefits and costs. The analysis was useful not only in formulating the state system, but also in establishing priorities for development among system airports.

Carstens, RL (Iowa State University, Ames) Murphy, JW *ASCE Journal of Transportation Engineering* Vol. 103 No. 6, Nov. 1977, pp 751-762, 10 Ref.

ACKNOWLEDGMENT: EI
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06 173818
AIRPLANE BUILDERS PREPARE ASSAULT ON ECONOMICS BARRIER
This special report discusses the present and future market situation for airframe and engine manufacturers and highlights several issues confronting the industry. The first article discusses the importance of economic and environmental considerations when designing airframes and engines for the future. The second article looks at the problems facing Boeing Company as it attempts to reconcile two different carrier requirements. The third article discusses McDonnell Douglas's programe as it prepares itself to meet the future of the 1980's and 90's. The fourth article looks at Lockheed as it examines the possibility of launching a new or derivative airplane program, only on a smaller scale. The fifth article examines the efforts of Pratt and Whitney to come up with an engine design capable of being tailored to produce anywhere from 25,000 lb. to 35,000 lb. of thrust. The sixth article examines the efforts of General Electric to break out of its current role of just selling engines for the larger wide-bodies and focuses instead on supplying engines for smaller transport. The final article assesses the European aerospace industry with respect to whether their products will sell in the vitual U.S. market.

Woolsey, JP Baumgarner, JD *Air Transport World* Vol. 15 No. 2, Feb. 1978, pp 20-21

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

06 173824
LOWER AIRLINE COSTS PER PASSENGER ARE POSSIBLE IN THE UNITED STATES AND COULD RESULT IN LOWER FARES
No Abstract.
Civil Aeronautics Board report to Congress.

General Accounting Office CED-77-34, Feb. 1977, 188 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
GA1.13:CED-77-34

06 174349
STUDIES IN THE ECONOMICS OF FEDERAL TRANSPORTATION POLICY #2. ECONOMETRIC ESTIMATION OF COST FUNCTIONS IN THE TRANSPORTATION INDUSTRIES
The validity of econometric estimates of the costs of the various transportation modes remains an issue surrounded by controversy. While there have been numerous econometric studies of rail, trucking and airline costs, no one has yet developed a costing methodology that has yielded results that are generally accepted as valid. This inability to obtain a consensus concerning costing methodology and/or the validity of empirical results arises not so much from a lack of effort, but rather from the failure to specify the cost functions that appropriately characterize the structure of technology. Specifically, there appears to be three fundamental problems that one must address in specifying and estimating cost functions for the transportation industries. First, the output of a transportation firm, whatever the mode, is multidimensional by its very nature. Consequently, the mix of output can have a major impact upon the costs of any given firm. Second, it is generally agreed that the activities of each of the transportation modes are characterized by joint and common costs, implying that their technology is characterized by joint production. Third, to the extent that regulatory or other constraints prevent the firms in each mode from making optimal adjustments in capacity, they are not generally in a position of long-run equilibrium operating along their long-run cost function. Consequently,

efforts to estimate long-run cost functions directly from cross-sectional data will yield seriously biased coefficients and resulting measures of marginal costs. This paper reports on a general methodology using a translog cost function that meets the objections raised with respect to most cost functions: it permits multiple outputs and quality levels; it is of a sufficiently flexible form to test hypotheses concerning the underlying structure of production; and it can be used in either its short-run or long-run form.

Research supported by the Department of Transportation, Office of University Research.

Spady, R Friedlaender, AF
Massachusetts Institute of Technology CTS-76-13, Sept. 1976, 98 pp, 2 Fig., 38 Ref., 2 App.

Grant DOT-OS-50239

ACKNOWLEDGMENT: Massachusetts Institute of Technology
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

06 175019
A NEW METHOD FOR ESTIMATING CURRENT AND FUTURE TRANSPORT AIRCRAFT OPERATING ECONOMICS. CONTRACTOR REPORT, JANUARY 1976-OCTOBER 1977

A methodology was developed by which the operating cost associated with variations in aircraft design and technology characteristics can be assessed. This methodology addresses aircraft related operating cost elements and is based on an in-depth examination of airline operating experiences and relevant operating data. The assessment method produces a base line estimate of the operating cost elements relating to such design specification features as seat capacity, avionic equipment, design range, and design definition features such as maximum takeoff gross weight, and number of engines. Means for determining the deviations from this base line of the design or technological difference at the specific ATA System level are provided. The methodology was applied to assess the operating cost of one potential future advanced technology transport aircraft. An analysis was included to show the relative sensitivity of the operating cost to design parameters. Areas of potential future research on operating cost related technologies are identified.

American Airlines, Incorporated NASA-CR-145190, Jan. 1978, 267 pp

Contract NAS1-14284

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-13027/5ST

06 176468
ECONOMIC CROSS SUBSIDIZATION IN DOMESTIC AIR TRANSPORTATION

This paper presents an analysis of the economic incentives for a particular air carrier to provide air service to a particluar point. Economic cross subsidization is discussed as it exists in many industries other than domestic air service. A suggested definition of economic cross subsidization is presented as well as an argument for recongnizing this economic concept as primarily one of allocation of revenues rather than as primarily an allocation of accounting costs, which has been the traditional approach. Issues of product definition are also discussed. /Author/

This article appeared in the Transportion Research Record 635, Price and Subsidy in Intercity Transportation and Issues of Benefits and Costs.

Leister, DV (Nevada University, Reno) Stram, BN (Department of Transportation) *Transportation Research Record* No. 635, 1977, pp 11-17, 6 Ref.

ORDER FROM: TRB Publications Off

06 176652
POLICY PROBLEMS AND ECONOMICS OF AIRCRAFT NOISE

The paper discusses the role of economics in decisions which affect aircraft noise, for example decisions on airport development or on land uses around airports. Methods of measuring the effects of aircraft noise and of costing them are analyzed. Major policy options and economic analysis of them are discussed. Suggestions for further research and improved policies are made.

Abelson, PW (Macquarie University, Australia) *Transportation Research* Vol. 11 No. 5, Oct. 1977, pp 357-364, 24 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 176831
DETERMINING ALL NONDEGENERATE SHADOW PRICES FOR THE TRANSPORTATION PROBLEM

This paper provides an efficient procedure for computing all nondegenerate (or "real") shadow prices. The method involves breaking the optimal basis tree into subtrees by dropping basic variables which are at their bounds, defining a measure of distance between the subtrees and solving a shortest path problem between all pairs of subtrees.

Fong, CO (Malaya University, Malaysia) Srinivasan, V *Transportation Science* Vol. 11 No. 3, Aug. 1977, pp 199-222, 9 Ref.

ACKNOWLEDGMENT: EI
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06 177446
LANDING FEES EXPLOSION--JUST A DAMP SQUIB

Recent complaints about excessive increases in charges levied by the airports and air navigation authorities have been counteracted by figures published by the ICAO which suggest that the unit cost of airport charges to airlines has recently become static, and in real terms has even declined. The figures are devoted exclusively to landing and departure fees; they do not change of navigation sevices, or en-route charges. The distinction between the two is an important one, for the en-route charge is not as a rule the concern for the airport authority. IATA's concern relates to en-route charges, and it appears that the association would make a better case for its members were it to distinguish them more clearly from landing fees.

Woolley, D *Airports International* No. 66, Apr. 1978, pp 17-20

ACKNOWLEDGMENT: Airports International
ORDER FROM: IPC Transport Press

06 178267
TRANSPORT BIBLIOGRAPHY: TRANSPORT AND THE COMMON MARKET

This bibliography is on the subject of transport and the common market.

Chartered Institute of Transport Bibliog. No. 101, Nov. 1975, 7 pp, Refs.

ACKNOWLEDGMENT: TRRL (IRRD-224399)
ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

06 178459
WHERE THE BUCK STARTS!

There are three forcing factors which mandate the appearance--but not necessarily the timing--of new commercial jet transport aircraft in the world's civil air fleets. These factors are traffic growth, old age-efficiency-economy-energy, and environment. While the need, and the potential market, for new commercial jet transport aircraft is abundantly clear, the availability of financial--not technical--resources to launch these new aircraft is far less evident.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Browne, SD
American Society of Civil Engineers Proceeding 1977, pp 57-60

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

06 180127
ECONOMIC INCENTIVES FOR NOISE ABATEMENT AT AIRPORTS

Taxes levied on aircraft landings that involve high decibel levels are proposed as a means of encouraging manufacturers and airlines to reduce aircraft noise emissions. It is suggested that the taxes, or noise charges, be based on the cost of noise abatement measures put into effect at airports. Aircraft noise charges instituted by the Netherlands, France, Japan and Germany are considered.

Inter-Noise 77, Noise Control-The Engineers Responsibility; Proceedings of the Sixth International Conference, Zurich Switzerland, March 1-3, 1977. (A78-12812 02-71) Zurich.

Alexandre, A Barde, JP (Organization for Economic Cooperation and Devel)
International Inst of Noise Control Engineering Proceeding 1977, p A64

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12813)
ORDER FROM: AIAA

A78-12813

06 180423
COST AND OPERATIONAL EFFECTIVENESS OF R&M IMPROVEMENTS

This paper introduces a new, integrated technique for evaluating potential aircraft modifications. The approach is the execution of a computer program that measures the cost and operational effectiveness of reliability and maintainability improvements within a task accomplishment structure. It can be effectively used in three ways. First, it can be employed to evaluate the profitability of a product improvement. Second, it can be used to optimize a candidate product improvement program. This can be achieved by varying the R&M improvement level, varying the incorporation policy and sceheule, and analyzing the O&M cost output. Finally, the technique can be used to help choose among competing product improvement programs, by comparing their respective cost and operational measures of effectiveness.

Proceedings of the Annual Reliability and Maintainability Symposium, Los Angeles, January 17-19, 1978. Also available from IEEE (78CH1308-6R).

Blewitt, SJ (Boeing Vertol Company)
Institute of Electrical and Electronics Engineers Proceeding IEEE 1562, 1978, pp 417-421

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 133498
TRANSPORTATION NOISE BIBLIOGRAPHY
This overview of the scope of current activity provides annotated bibliographic data relating to selections which range from short journal articles to longer research reports and conference proceedings. The items have been selected on the basis of topical interest to the non-specialist, intensive coverage of a subject, and readability. The individual abstracts are derived from the original texts. The data are presented in nine different areas: overview of sound and the elements of noise control and abatement; the effects of noise on man; noise sources; community reaction to transportation noise; economic aspects of noise control and abatement; methods of measuring, surveying and evaluating environmental transportation noise; legal, administrative and operational aspects of implementing noise control and abatement programs; interrelationship of noise control; major approaches to transportation noise control and abatement.

Transportation Systems Center DOT-TSC-OST-76-63, July 1975, 84 pp

ORDER FROM: NTIS

PB-264521/6ST

07 154333
SEMIEMPIRICAL AIRFRAME NOISE PREDICTION MODEL AND EVALUATION WITH FLIGHT DATA
A semiempirical maximum overall sound pressure level (OASPL) airframe noise model was derived. Noise radiated from aircraft wings was modeled on the trailing edge diffractes quadrupole sound theory. The acoustic dipole sound theory was used to model noise from the landing gear. The model was correlated with maximum OASPL flyover noise measurements obtained for three jet aircraft. One third octave band sound pressure level flyover data was correlated and interpreted.

Hersh, AS Burcham, FWJ Putnam, TW Lasagna, PL
Dryden Flight Research Center NASA-TM-X-56041, H-951, Dec. 1976, 36 pp

Contract NAS4-2250

ACKNOWLEDGMENT: NTIS
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N77-13791/7ST

07 154358
THREE-DIMENSIONAL EFFECTS IN SONIC BOOM THEORY
Examining the validity and applicability in sonic boom calculations of (a) the Whitham-Walkden theory and (b) the first order approximation of a perturbation theory, based on the method of characteristics, it was found by Oswatitsch and Sun that the two methods yield different pressure signatures in the far field of a supersonic delta wing. The reason for the differences is discussed; by means of a simple procedure the reliability of both theories is compared in case they give different results. From these considerations it becomes evident that in the near field of planar systems the method under (b) should be used, that in the midfield a second order approximation is sometimes necessary, and that in the far field the Whitham-Walkden method is reliable and simple.

Hendriks, TPM
Technische Hogeschool, Netherlands VTH-196, Sept. 1975, 41 pp

ACKNOWLEDGMENT: NTIS
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N77-13013/6ST

07 154374
ENGINEERING FEASIBILITY STUDY FOR AN INDUSTRIAL PARK/PORT FACILITY AT KOTZEBUE, ALASKA
The report covers an engineering feasibility study regarding a proposed industrial park/port facility project. It deals with the requirements of the modified scope of work as well as other necessary information.
Prepared by Kelly, Pittelko, Fritz and Forssen, Anchorage, Alaska.

Kelly, Pittelko, Fritz and Forssen, Economic Development Administration FDA-77-036, Feb. 1977, 29 pp

Grant EDA-07-6-01646

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-263608/2ST

07 154389
PROFILE-CLINTON-SHERMAN INDUSTRIAL AIR PARK, BURNS FLAT, OKLAHOMA
This study is a profile containing a vast amount of information on the closing of the naval air station near Burns Flat, Oklahoma and its success as an industrial air park. The Midwestern Oklahoma Industrial Foundation was formed and their purpose was to bring industry into the area to offset the economic loss from closure of the air base. MODA took control and with development efforts the Clinton-Sherman Industrial Air Park is now a unique concept in industrial complexes. The Clinton-Sherman area is not a city, but a spacious, attractive industrial park. The park is now a civilian-owned and operated air park, dedicated to broadening the economic base of western Oklahoma for the benefit of businessmen and residents and of new industry locating in area communities.

South Western Oklahoma Development Authority, Economic Development Administration EDA-76-071, Sept. 1975, 110 pp

Grant EDA-08-6-01561-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-263222/2ST

07 154608
COMPREHENSIVE PLAN AND DEVELOPMENT PROGRAM FOR A REGIONAL INDUSTRIAL AIRPARK, SPRINGFIELD MUNICIPAL AIRPORT FOR THE CITY OF SPRINGFIELD, MISSOURI
The report outlines two objectives to be undertaken in the study. First, to develop a Regional Industrial Airpark plan at the Springfield Municipal Airport to complement the airport development. Second, to analyze existing available data and apply this data to the planning process in order to develop a recommended plan of implementation for making the airpark actually come into being. Several types of land uses had to be evaluated and several review and analysis are reported.
Prepared by Thompson (Arnold) and Associates, Inc., Chicago, Ill., and Isbill Associates, Inc., Denver, Colo.

Springfield Municipal Airport Board, Thompson (Arnold) and Associates, Isbill Associates, Incorporated, Economic Development Administration EDA-77-011, Dec. 1976, 128 pp

Grant EDA-05-6-01565

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-262474/0ST

07 155013
AIRCRAFT SONIC BOOM: EFFECTS ON BUILDINGS (A BIBLIOGRAPHY WITH ABSTRACTS)
Research findings are cited on the effects of sonic booms on buildings, structural components, forms, windows, and walls. Test-house investigations are included, along with damage analysis and vibration response. Documentation is made on residential buildings. Other topics contained in the volume range from theory to failure analysis. Sonic boom propagation and effects on biological forms, including human responses, are cited in separate bibliographies. (This updated bibliography contains 70 abstracts, 10 of which are new entries to the previous edition.)
Supersedes NTIS/PS-76/0176.

Adams, GH
National Technical Information Service Apr. 1977, 75 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0219/4ST

07 155043
THE ACTION OF SST EMISSIONS ON THE OZONE LAYER
Mass transfer mechanisms in the stratosphere are described together with periodic changes in the global distribution of stratospheric ozone. Mechanisms proposed for the production and destruction of ozone are reviewed, with particular emphasis placed on the role of nitrogen oxides at different altitudes. It is estimated that the sum of the volume molar fractions of NO, NO2 and HNO3 between 20 and 35 km is practically constant, with a value of about 12.10 times ten to the minus ninth power. A large portion of these nitrogen compounds originated in the natural processes of denitrification of

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AIR TRANSPORTATION BIBLIOGRAPHY.(U)
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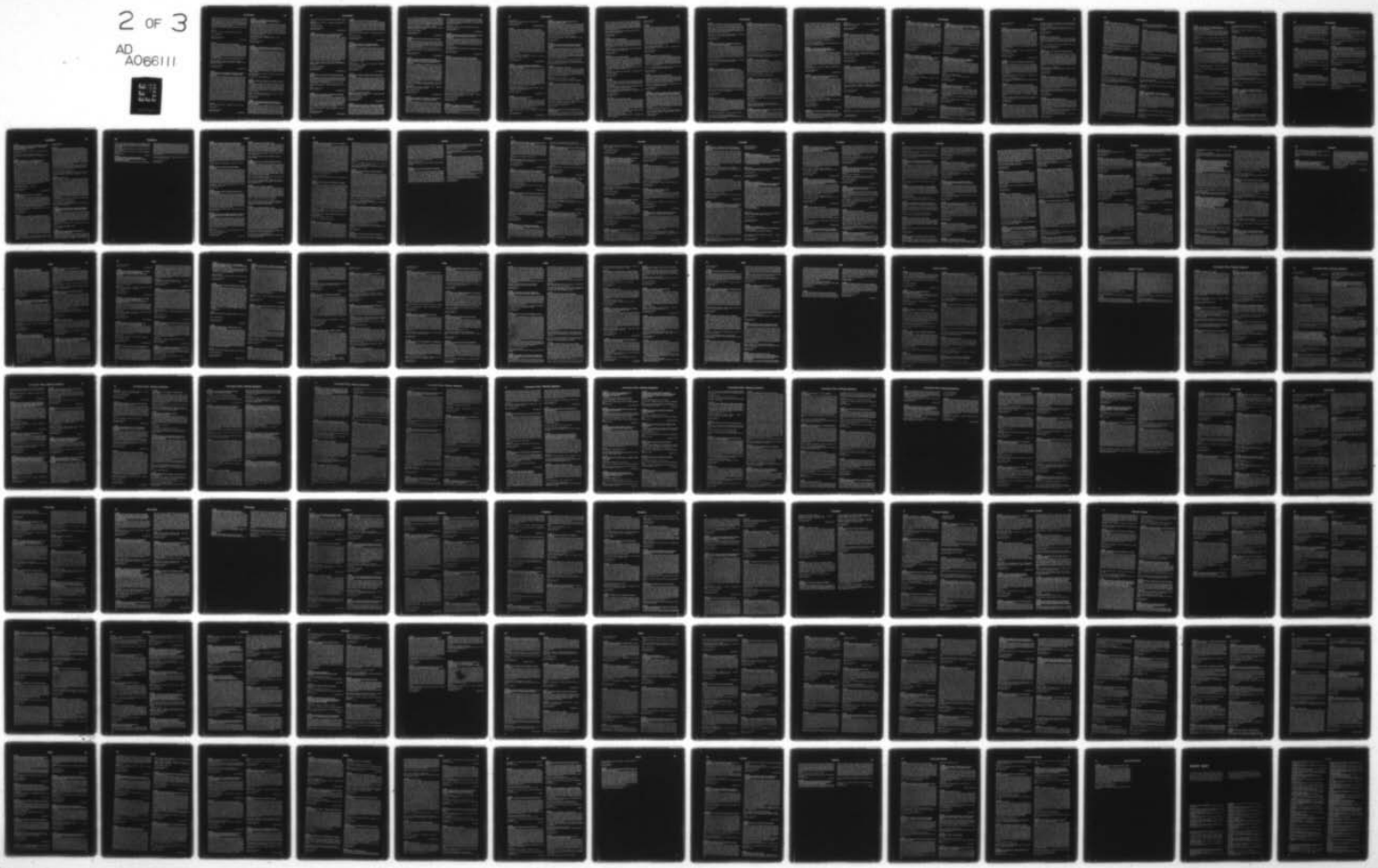

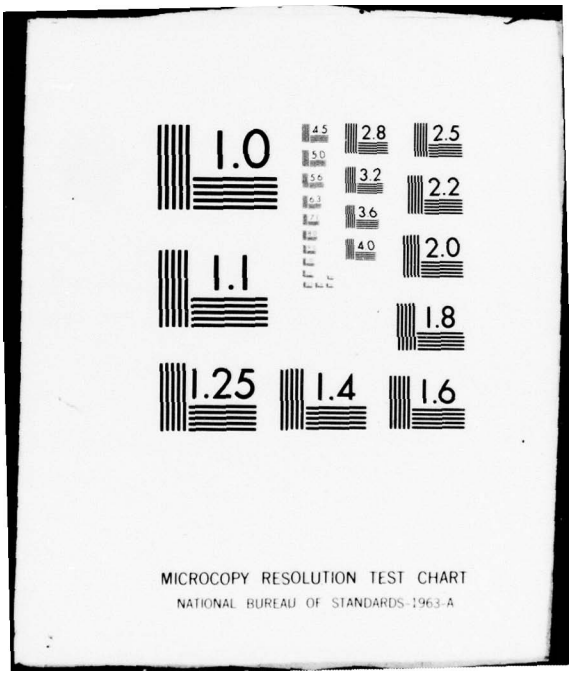
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organic materials. It is further estimated that a yearly 0.39 per cent reduction in the ozone layer could occur as a result of the flight of a fleet of 100 Concorde-type supersonce transports at altitudes of 16-17 km in the Northern Hemisphere; the corresponding figure for SST-type transports, flying at 20 km altitude, is about 4 percent. A 0.39 per cent yearly reduction of the ozone layer may be expected to result in one additional fatality per annum due to skin malignancies in France.

Tran-Transl. Into English from la Meteorologie (France), Mar. 1976 p 71-80.

Brun, EA
Kanner (Leo) Associates NASA-TT-F-17312, Jan. 1977, 19 pp

Contract NASW-2790

ACKNOWLEDGMENT: NTIS
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N77-15530/7ST

07 155053
POLLUTANT EMISSIONS IN THE STRATOSPHERE

A survey is presented of pollutant emissions by turbojet engines. Chemical and physical processes resulting in the formation of polluting species in the combustor are described. Measurement techniques for determining species concentrations in the combustors and jet exhaust are considered. Pollutant formation mechanisms are dealt with from a constructor's point of view. Correlations of nitrogen oxide and carbon monoxide emissions are proposed for most existing engines, and in more detail for the Olympus turbojet mounted on the Concorde aircraft. Low pollution engines are discussed, and a two module combustor, allowing a reduction of nitrogen oxide production, is described. [French]

Misc-Report Will Also Be Announced as Translation (Esa-TT-341).

Barrere, M Borghi, R Caruel, J Devienne, M Duterque, J
Office Nat d'Etudes et de Recherches Aerospatiales ONERA-P-1976-3, COVOS-5, 1976, 102 pp

ACKNOWLEDGMENT: NTIS
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N77-16466/3ST

07 158626
A COMPARISON OF A LABORATORY AND FIELD STUDY OF ANNOYANCE AND ACCEPTABILITY OF AIRCRAFT NOISE EXPOSURES

Residents living in close, middle and distant areas from JFK Airport were included in a field interview and laboratory study. Judgments were made of simulated aircraft noise exposures of comparable community indoor noise levels and mixes of aircraft. Each group of subjects judged the levels of noise typical for its distance area. Four different numbers of flyovers were tested: less than average for each area, the approximate average, the peak number, or worst day, and above peak number. The major findings are: (1) the reported integrated field annoyance is best related to the annoyance reported for the simulated approximate worst day exposure in the laboratory; (2) annoyance is generally less when there are fewer aircraft flyovers, and the subject has less fear of crashes and more favorable attitudes toward airplanes; (3) beliefs in harmful health effects and misfeasance by operators of aircraft are also highly correlated with fear and noise annoyance; (4) in direct retrospective comparisons of number of flights, noise levels and annoyance, subjects more often said the worst day laboratory exposured more like their usual home environments; and (5) subjects do not expect an annoyance-free environment. Half of the subjects can accept an annoyance level of 5 to 6 from a possible annoyance range of 0 to 9, 28% can live with an annoyance intensity of 7, and only 5% can accept the top scores of 8 to 9.

Borsky, PN
Columbia University, New York NASA-CR-2772, Feb. 1977, 73 pp

Grant NSG-1164

ACKNOWLEDGMENT: NTIS
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N77-17608/9ST

07 159191
A REVIEW OF METHODOLOGICAL FACTORS IN PERFORMANCE ASSESSMENTS OF TIME-VARYING AIRCRAFT NOISE EFFECTS

Literature on the effects of general noise on human performance is reviewed in an attempt to identify (1) those characteristics of noise that have been found to affect human performance; (2) those characteristics of performance most likely to be affected by the presence of noise, and (3) those characteristics of the performance situation typically associated with noise effects. Based on the characteristics identified, a theoretical framework is proposed that will permit predictions of possible effects of time-varying aircraft-type noise on complex human performance. An annotated bibliography of 50 articles is included.

Coates, GD Alluisi, EA Adkins, CJJ
Old Dominion University NASA-CR-2789, Mar. 1977, 38p

Grant NSG-1092

ACKNOWLEDGMENT: NTIS
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N77-19752/3ST

07 159806
INTERNOISE 77-PROCEEDINGS OF 1977 INTERNATIONAL CONFERENCE ON NOISE CONTROL ENGINEERING, MARCH 1-3, 1977, ZURICH

The following papers were among those presented at the Conference on noise control engineering-past, present and future Swiss legislation for noise control, Verdan, Q; Codes for noise and vibration control in Japan, Nimura, T; Noise control in urban areas, Kurze, UJ; Economic impact of noise certification, Large, JB; Exposure and response to traffic noise, Harland, DG; Aircraft noise control, Eldred, KM; Reliability of traffic noise predictions, Jonasson, HG; The physical and subjective evaluation of roadside barriers, Scholes, WE; Study of noise production by car and motorcycle races, Cops, A; Reactive mufflers for exhaust systems--a design method, Steenackers, P; A simple approach to the control of motor vehicle noise in developing countries, Ko, NWM; On the prediction of aerodynamic noise generated by high-speed railway trains, King, WF; Noise barriers for fast passenger trains, Hemsworth, B; Noise reduction by vegetation, Yamada, S; Traffic noise simulation, Silva, PM; Prediction of urban traffic noise, Moses, N; Effects of road traffic noise on residents, Wanner, HU; Relation between the annoyance of traffic noise and physical noise level data, Buchta, E. /TRRL/

Swiss Federal Institute of Technology Proceeding 1977, 984 pp, Figs., Tabs., Phots., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-225579)

07 165173
PRACTICAL NOISE ABATEMENT FOR A GENERAL AVIATION AIRPORT

Bowman Field, like a number of other major general aviation airports, has a large number of operations by propeller-driven small airplanes. In response to increasing noise complaints from neighbors, a comprehensive noise abatement program has been developed which should find applicability at similar facilities. The following article discusses the program and emphasizes the results of noise level monitoring and a tradeoff analysis of possible abatement techniques.

Hamilton, WS (Louisville and Jefferson City Air Board) *Sound and Vibration* Vol. 11 No. 2, Feb. 1977, pp 24-27

ACKNOWLEDGMENT: EI
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07 166006
LAWRENCE LIVERMORE LABORATORY FIRST ANNUAL REPORT TO THE HIGH ALTITUDE POLLUTION PROGRAM. ANNUAL REPORT

This report presents major accomplishments and significant findings of research conducted during the first year of contract to the FAA High Altitude Pollution Program, ending June 30, 1976. The overall research effort is concerned with numerical modeling of the atmospheric response to aerospace utilization of the stratosphere. It encompasses four areas of study: photochemical kinetics; coupled kinetics and transport; radiative transfer; and meteorological analysis. Additional limited studies have been conducted

using the Laboratory's two-dimensional climate model (ZAM2). (Author)

Luther, FM
California University, Livermore FAA-EQ-77-6, UCRL-50042-76, June 1976, 52 pp

Contract DOT-TSC-76-1

ACKNOWLEDGMENT: NTIS
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AD-A040627/2ST

07 166007
AIRCRAFT EMISSIONS: POTENTIAL EFFECTS ON OZONE AND CLIMATE- A REVIEW AND PROGRESS REPORT
A critical review is made of information relative to effects of aircraft emissions (NOx, SO2, H2O) projected to 1990 on the earth's protective ozone shield and on mean surface temperature, as estimated from appropriate mathematical models. Potential biological effects are not reviewed. The review provides information showing the large uncertainties in computations of effects on ozone, due to uncertainties in NOx emission indices (accepted values may be several-fold low), in chemistry, in troposphere-stratosphere interchange processes, and in future stratospheric composition (principally chlorine content); estimates of effects can be expected to change as new data are obtained. Current results indicate that aircraft NOx effects on the ozone column change sign with aircraft altitude: subsonic aircraft, cruising at 6-km to 14-km altitude, enhance or have almost no effect on the ozone column; supersonic aircraft (mach-2 class), cruising at 16-km to 19-km, reduce total ozone, but, for given NOx rates, by amounts less than previously reported. Computations based on a 'high' (rapid growth) estimate for the 1990 total fleet of subsonic and supersonic aircraft, assuming current engines and accepted NOx emission indices, including an estimated 142 Concordes and Tupolevs, showed an average ozone enhancement in the Northern Hemisphere of about 0.4 percent to 0.9 percent, varying with season.

Oliver, RC Bauer, E Hidalgo, H Gardner, KA Wasylkiwskyj, W
Institute for Defense Analyses Final Rpt. FAA-EQ-77-3, P-1207, Mar. 1977, 401 pp

Contract DOT-FA76WA-3757

ACKNOWLEDGMENT: NTIS
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AD-A040638/9ST

07 166083
ENVIRONMENTAL POLLUTION: NOISE POLLUTION-SONIC BOOM
This bibliography contains citations of studies and analyses covering a wide range of the parameter of sonic boom and noise pollution, as well as damages caused by it. Corporate Author-Monitoring Agency, Subject, Title and Personal Author are provided. (Author)
Supersedes Rept. no. DDC-TAS-73-74 dated Nov 73, AD-769 970.

Defense Documentation Center Bibliog DDC/BIB-77/06, June 1977, 201 pp

ACKNOWLEDGMENT: NTIS
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AD-A041400/3ST

07 166100
ENVIRONMENTAL POLLUTION, NOISE POLLUTION-NOISE EFFECTS ON HUMAN PERFORMANCE
This bibliography is a selection of unclassified and unlimited distribution references on Noise Pollution-Noise Effects on Human Performance. These citations of reports present information on noise effects on human performance such as motor reactions, hearing speech, sleep, perception, nervous systems, visual signals and fatigue. Corporate Author-Monitoring Agency, Subject, Title and Personal Author are provided. (Author)
Supersedes Rept. no. DDC-TAS-71-39-1 dated Aug 71, AD-729 850, and Rept. no. DDC-TAS-73-69 dated Nov 73, AD-769 900.

Defense Documentation Center Bibliog. DDC/BIB-77-07, June 1977, 324 pp

ACKNOWLEDGMENT: NTIS
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AD-A041600/8ST

07 166239
AIRCRAFT COMMUNITY NOISE IMPACT STUDIES
The objectives of the study are to: (1) conduct a program to determine the community noise impact of advanced technology engines when installed in a supersonic aircraft, (2) determine the potential reduction of community noise by flight operational techniques for the study aircraft, (3) estimate the community noise impact of the study aircraft powered by suppressed turbojet engines and by advanced duct heating turbofan engines, and (4) compare the impact of the two supersonic designs with that of conventional commercial DC-8 aircraft.

Douglas Aircraft Company, Incorporated NASA-CR-145152, Jan. 1977, 85 pp

Contract NAS1-14488

ACKNOWLEDGMENT: NTIS
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N77-24638/7ST

07 166469
PRELIMINARY DESIGN OF AN AIRCRAFT NOISE MEASUREMENT SYSTEM FOR CERTIFICATION AND RESEARCH
System requirements are presented for a noise measurement system capable of performing tests conforming to FAR Part 36 and for a research noise measurement system applicable to a broad range of objectives. The characteristics of subsystems for the functions of acoustical data collection, aircraft tracking, weather data collection, aircraft performance data collection and data processing are discussed. Alternative subsystems representative of a range of performance capabilities and costs are considered in terms of specific measurement objectives and other factors. Example system configurations for both certification and research applications are described. The study emphasizes conceptual design rather than detailed equipment-/system specifications. (Author)

Cooper, BK
Tracor, Incorporated Final Rpt. FAA-RD-75-217, TRACOR-T75-AU-9531U, Jan. 1977, 226 pp

Contract DOT-FATQWA-3900

ACKNOWLEDGMENT: NTIS
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AD-A042798/9ST

07 166533
VALIDATION OF AIRCRAFT NOISE EXPOSURE PREDICTION PROCEDURE
The NOISEMAP predictive procedure is used to describe the noise environment around airbases and thereby aid airbase planners to prevent community encroachment limiting the effectiveness of the installation. This report delineates the results of measurements made over one to three week periods at four Air Force airbases to acquire the data needed to validate and/or modify the noise predictive algorithms in NOISEMAP for takeoff, landing, traffic pattern, and ground runup operations. In general, the algorithms currently used in NOISEMAP provided predictions that agreed well with measured data. It was found the obtaining accurate data on aircraft operational procedures (engine power settings, airspeeds, and flight paths) was essential.

Seidman, H Horonjeff, RD Bishop, DE
Bolt, Beranek and Newman, Incorporated, (7231) Final Rpt. BBN-3299, AMRL-TR-76-111, Apr. 1977, 87 pp

Contract F33615-76-C-5003

ACKNOWLEDGMENT: NTIS
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AD-A041674/3ST

07 166539
FURTHER SENSITIVITY STUDIES OF COMMUNITY-AIRCRAFT NOISE EXPOSURE (NOISEMAP) PREDICTION PROCEDURES
This report describes the results of studies of the sensitivity of the noise exposure contours to various model parameters and assumptions presently in the NOISEMAP procedure. The areas within Day/Night Level (LDN) contours for ten Air Force airbases increased by 11 to 40 percent when the noise measure was adjusted for the presence of pure tones. The contour areas for typical mixed fighter, bomber/tanker, and training airbases were reduced

by 3 to 11 percent by substitution of the SAE algorithms for ground-to-ground propagation and transition models, whereas adding the fuselage shielding algorithm reduced the contour areas by 13 to 22 percent. Since there is little firm evidence showing one set of algorithms more accurate than the other, the present NOISEMAP models will be retained until further technical analyses or new data show a clear basis for alteration.

Bishop, DE Dunderdale, TC Horonjeff, RD Mills, JF
Bolt, Beranek and Newman, Incorporated, (7231) Final Rpt. BBN-3295, AMRL-TR-76-116, Apr. 1977, 88 pp

Contract F33615-76-C-0507

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041781/6ST

07 166544
ENVIRONMENTAL POLLUTION: AIR POLLUTION-EXHAUST GASES

This bibliography contains citations of reports dealing with exhaust gases, air pollution from exhaust gases emanating from ground to air transportation, exhaust systems of jet engines, helicopters, turbojet engines and rocket motors. Corporate Author-Monitoring Agency, Subject, Title and Personal Author are provided. (Author)

Supersedes Rept. no. DDC-TAS-73-77 dated Dec 73, AD-771 710.

Defense Documentation Center Bibliog. DDC/BIB-77/08, July 1977, 294 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041800/4ST

07 166573
COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS. NOISEMAP COMPUTER PROGRAM OPERATION MANUAL ADDENDUM FOR VERSION 3.3 OF NOISEMAP

This report outlines modifications to NOISEMAP 3.2 and a user oriented description of a NOISEMAP data screening program called DATASCREEN. Changes to NOISEMAP include: new identification options for the FLTTRK, DEPART, and RNPPAD cards; option to print only those pages from PRPLOT, ARPLOT, DMPGRD, or PRINT cards that contain parts of a contour; option to reduce the number of alignment pages; option to suppress the listings of SEL profiles; interface with GPCP is no longer restricted to a grid spacing of 1000 feet or less; addition of the CLEAR keyword that will expunge all entries in the library. The new program, DATASCREEN, provides an improved summary, improved error diagnostics, and additional graphic outputs. A deck prepared for DATASCREEN will be accepted by NOISEMAP. The purpose of DATASCREEN is to provide the user with an efficient screening program to use in preparing a data deck for Ldn contours.

Addendum 1 to Appendix dated Feb 76, AD-A022 911. See also basic report dated Jul 74, AD-785 360. Availability: Microfiche copies only.

Reddingius, NH
Bolt, Beranek and Newman, Incorporated, (7231) BBN-3409, AMRL-TR-73-108-App-A, May 1977, 30 pp

Contract F08635-76-C-0188

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A042143/8ST

07 166677
JUDGEMENTS OF RELATIVE NOISINESS OF A SUPERSONIC TRANSPORT AND SEVERAL COMMERCIAL-SERVICE AIRCRAFT

Two laboratory experiments were conducted on the relative noisiness of takeoff and landing operations of a supersonic transport and several other aircraft in current commercial service. A total of 96 subjects made noisiness judgments on 120 tape-recorded flyover noises in the outdoor-acoustic-simulation experiment; 32 different subjects made judgments on the noises in the indoor-acoustic-simulation experiment. The judgments were made by using the method of numerical category scaling. The effective perceived noise level underestimated the noisiness of the supersonic transport by 3.5 db. For takeoff operations, no difference was found between the noisiness of the supersonic transport and the group of other aircraft for the A-weighted rating scale; however, for landing operations, the noisiness of the supersonic transport was overestimated by 3.7 db. Very high correlation was found between the outdoor-simulation experiment and the indoor-simulation experiment.

Powell, CA
Langley Research Center NASA-TN-D-8434, June 1977, 56 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-26702/9ST

07 166728
HEALTH HAZARD EVALUATION/TOXICITY DETERMINATION REPORT 76-58-342, FRONTIER AIRLINES, DENVER, COLORADO

A health hazard evaluation conducted in the non-destructive laboratory of the Frontier Airlines hangar, revealed that personal breathing zone and general room concentrations of cyclohexane were well below the most recent evaluation criteria. One worker employed in the vicinity of a low level ultraviolet light had skin cancer which, according to expert opinion, was not work related.

Gunter, BJ Meyer, C
National Institute for Occupational Safety & Hlth NIOSH-TR-76-58-342, Nov. 1976, 7 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-269140/0ST

07 166766
COSTS AND NATIONAL NOISE IMPACT OF FEASIBLE SOLUTION SETS FOR REDUCTION OF AIRPORT NOISE

The purpose of this study was to determine the effectiveness and costs associated with feasible solution alternatives for the reduction of cumulative noise impact from airport and aircraft operations. Results of the analysis will be used in a separate study for assessing economic impact under a variety of financing schemes and at different levels of noise reduction in support of the proposed airport noise regulatory program initiated under the Noise Control Act of 1972. Solution sets considered encompass aeronautical alternatives, operational alternatives, and receiver alternatives. Specific costs, in terms of 1975 dollars, are given for the aeronautical and receiver alternatives. Except for the 6 degrees/3 degrees approach, the operational alternatives are treated as zero cost options for this study. Source noise and operational noise reduction methods were tested against individual civil air carrier airports and airport models derived from representative airport samples for current and future time periods. Future aircraft fleet projections considered new trends indicated by the current energy shortage; evaluation of people impacted in the future allowed for a fixed populaton growth around all airport environs. Effectivness of the various noise reduction methods was evaluated in terms of noise impact area, populaton, and land and housing value data determined for individual airports, three representative airport categories, and 514 air carrier airports. All noise impact results were calculated in terms of Ldn levels and Noise Units. These data, in conjunction with cost factors associated with the various noise reduction schemes, provide the parameters by which on economic impact assessment can be conducted. The noise impact of over 6600 general aviation airports in the U.S. was estimated in a similar but less comprehensive manner.

Meindl, HG Sutherland, LC Spiro, H Bartel, C Pies, D
Wyle Laboratories, Environmental Protection Agency WR-75-9, EPA-230/3-77/017, Feb. 1976, 278 pp

Contract EPA-68-01-2836

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-269749/8ST

07 168647
MANEUVERING AIRCRAFT: NOISE POLLUTION AND CONTROL (A BIBLIOGRAPHY WITH ABSTRACTS)

Methods for alleviating noise created by maneuvering aircraft are cited. Flyby, turning flight, takeoffs, and landings are the maneuvers investigated. (This updated bibliography contains 288 abstracts, 64 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0733, NTIS/PS-75/762 and NTIS/PS-75/060.

Habercom, GE, Jr
National Technical Information Service Sept. 1977, 293 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0786/2ST

07 169366
AIR QUALITY IMPACT OF AIRCRAFT AT 10 USAF BASES
The contributions of Air Force aircraft to ambient air quality at 10 major bases were predicted from operational data using a computerized Gaussian dispersion technique. Annual arithmetic mean concentrations are presented for common air pollutants. The predictions are well below National Ambient Air Quality Standards for those pollutants with standards specified as annual averages. Hourly worst case predictions were converted to Pollutant Standards Index (PSI) values. Aircraft sources produced average PSI values of 4.9 for nitrogen dioxide, 2.1 carbon monoxide, 1.9 for total suspended particulates, and 1.4 for sulfur dioxide. The PSI scale ranges from 0 to 500 with 100 designated as the level above which health effects may occur. A PSI for hydrocarbons could not be computed since direct health effects have not been observed and indirect effects through oxidant formation could not be predicted within the scope of this analysis. The relative significance of pollutants emitted by AF aircraft indicated by this report is (from most significant to least significant): hydrocarbons, oxides, or nitrogen, particulate matter, carbon monoxide, and sulfur oxides. This ordering can be used as a guide to future design priorities and control strategy development.

Naugle, DF Grems, BC, III Daley, PS
Civil & Environmental Engineering Development Off Final Rpt. CEEDO-TR-76-23, Apr. 1977, 17 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A045464/5ST

07 169420
AIR QUALITY ASSESSMENT MODEL FOR AIR FORCE OPERATIONS-- SOURCE EMISSIONS INVENTORY ADTCUTER CODE DOCUMENTATION
The Air Force contracted with Argonne National Laboratory to develop a series of computer programs to assess the air quality impact of Air Force operations. These programs are called the Air Quality Assessment Model (AQAM). The AQAM contains three computer codes: A source emission inventory to quantify the hundreds of sources typically found on an airbase; a short term emission/dispersion model to make hourly air quality predictions; and a long term emission/dispersion model to make monthly or annual predictions. This report documents only the source emissions inventory computer code. While aircraft are emphasized, ground vehicles, space heating, and industrial sources can also be handled. Flow charts, listings, and brief descriptions of each subroutine are presented in this report. It is intended for readers with a computer programming background who wish to examine or alter the computer codes. (Author)

Bingaman, DJ Wangen, LE
Civil & Environmental Engineering Development Off, (1900) Final Rpt. CEEDO-TR-76-33, Apr. 1977, 165 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046229/1ST

07 169474
ENVIRONMENTAL POLLUTION: NOISE POLLUTION-AIRPLANE NOISE
This bibliography is an unclassified compilation of citations on Noise Pollution-Airplane Noise. These citations deal primarily with measuring and assessing the effects of noise exposure on hearing, speech, communications and community/airport noise. Reports pertaining to sonic boom specifically have been omitted. Corporate Author-Monitoring Agency, Subject, Title and Personal Author are provided. (Author)
Supersedes Rept. no. DDC-TAS-71-26-1, AD-724 850.

Defense Documentation Center Bibliog DDC/BIB-77/11, Nov. 1977, 398 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046800/9ST

07 170196
INFLUENCE OF DESIGN PARAMETERS ON LIGHT PROPELLER AIRCRAFT NOISE
Through research and test work, the aircraft industry has gained a better knowledge of the design parameters which influence the noise produced by light propeller driven aircraft. The parameters found to have a major affect on the noise include: propeller tip speed, propeller blade tip thickness, and engine exhaust system characteristics. To date, many special design considerations such as geared or shrouded propellers have not proven effective in reducing noise levels. When developing an aircraft for reduced noise, its cost, performance, and utility must be considered.
Prepared for SAE Meeting 28 Feb-4 March, 1977.

Rathgeber, RK (Cessna Aircraft Company) Sipes, DE
Society of Automotive Engineers Preprint SAE 70444, 1977, 12 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 170865
THE SPHERE OF INFLUENCE OF INDUSTRIAL LOCATION FACTORS: A CASE STUDY OF THE USE OF HEATHROW AIRPORT
This paper introduces and discusses the concept of the "sphere of influence" of industrial location factors, suggesting some ways in which it relates to regional development policies. The case study of the sphere of influence of Heathrow Airport is then presented, based on the use made of the airport for commercial purposes, in practice a number of "use types" can be distinguished, for which the related "spheres of influence" also vary spatially and in intensity of industrial involvement. Finally, some wider implications are drawn from the Heathrow example.

Hoare, A *Geoforum* Vol. 6 No. 3/4, 1975, pp 219-230, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

07 170868
NOISE FROM AIRCRAFT IN DENMARK
Comparison of the methods for rating aircraft noise zones in Denmark, Sweden, Norway, West Germany, and Great Britain is made. An analysis is given of the complaints of aircraft noise around Kastrup airport 1967-1973. Aircraft noise zones around 29 airfields in Denmark are constructed. The result is that different environmental standards must be dealt with in rural areas and in urban areas.

Andersen, T
Royal Technical University of Denmark Sept. 1976, n.p.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

07 172457
AIRCRAFT NOISE AND OTHER TYPES OF POLLUTION
A review of the problem of aircraft noise in Canada and the USA, points out that in the USA the total sought by plaintiffs from airport operators on account of excessive noise at present exceeds $5.5 billion, and about $23 million has already been awarded to schools and hospitals. In Canada it is estimated that 15% of the population live where aircraft noise is excessive. The numerical representation of aircraft noise is analysed in terms of disturbance effects. Physiological and psychological effects discussed include, work performance, loss of sleep, speech and hearing interference, the startle reflexes of sonic booms and the consequent risks to health in some situations (the handling of machinery, sharp objects or dangerous liquids), and the effects on pregnancy and low birth weight. Air and water pollution associated with air transport are also briefly discussed. /TRRL/

Hurtubise, FG McKay, DH Macenko, F *Aeronautical Journal* Analytic Vol. 81 No. 803, Nov. 1977, pp 469-477, 45 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-230355)
ORDER FROM: ESL

07 172722
SONIC BOOM THEORY: ITS STATUS IN PREDICTION AND MINIMIZATION
This paper gives a brief review of the currently accepted understanding of sonic boom phenomena and describes the manner in which modified linearized theory and geometric acoustics are used to predict the sonic boom

caused by a complex aircraft configuration. Minimization methods that have evolved in recent years are discussed, with particular attention given to a method developed by Seebass and George for an isothermal atmosphere which was modified for the real atmosphere by Darden. An additional modification which permits the relaxation of the nose bluntness requirement in the defining aircraft also is discussed. Finally, an overview of current areas of sonic boom research is given.

Darden, CM (Langley Research Center) *Journal of Aircraft* Vol. 14 No. 6, June 1977, pp 569-576, 20 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172740
AIR TRANSPORT NOISE REDUCTION
The article presents a review about various efforts to reduce the impact on people who live in areas surrounding airports. The discussion includes regulations and recent federal aviation noise abatement policy, trends in air transport noise, and noise reduction of the older, preregulation transport fleet. Technology relating to future design aircraft noise levels is also summarized.

Koenig, RJ (Federal Aviation Administration) *Noise Control Engineering* Vol. 8 No. 3, May 1977, pp 120-130, 41 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172754
BASIC AERODYNAMIC NOISE THEORY
The present state of knowledge in the theory of aerodynamic noise generation and propagation is outlined, with emphasis on the identification and the physical and analytical modeling of the major sound sources associated with turbulent airflows. The importance of source coherency with regard to flow inhomogeneities is outlined, and the relevance of studies into the sound propagation from acoustic singularities embedded in a sheared flow is discussed with respect to the jet noise problem.

AGARD Lecture Series, Aerodynamic Noise at von Karman Inst Meet, Rhode St., Genese, Belgium, December 6-9, 1976.

Fuchs, HV
Advisory Group for Aerospace Res & Dev-NATO No. 80, Paper 2, Jan. 1977, 26 pp, 35 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172755
JET NOISE
A review is presented of the components of the so-called "aircraft mixing noise" and the "shock-associated noise", which are supposed to be the only significant contributors to the "total noise" which exist downstream of the nozzle exit plane.

AGARD Lecture Series, Aerodynamic Noise, at von Karman Inst Meet, Rhode St., Genese, Belgium, December 6-9, 1976.

Fisher, MJ (Southampton University, England) Morfey, CL
Advisory Group for Aerospace Res & Dev-NATO No. 80, Paper 3, Jan. 1977, 23 pp, 21 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172756
GAS TURBINE ENGINE EXHAUST NOISE
The sources of noise which emanate from the exhaust of a gas turbine engine are discussed. The most important of these are considered to be associated with the combustion system, the turbine, the exhaust system, obstructions, and the turbulence/noise interaction with the jet structure. Also considered is the jet mixing noise due to single and coaxial streams. Wherever possible, prediction methods for these sources are given and reviewed. Reflections from the ground are also reviewed. Finally, the effects of flight or forward speed on these noise sources are considered.

AGARD Lecture Series, Aerodynamic Noise, at von Karman Inst Meet, Rhode St., Genese, Belgium, December 6-9, 1976.

Bushell, KW (Rolls-Royce Limited)
Advisory Group for Aerospace Res & Dev-NATO No. 80, Paper 4, Jan. 1977, 35 pp, 66 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172757
FAN NOISE
The nature of aircraft engine fan generated noise is described in terms of both spectral and radiative properties both statically and, where possible, in flight. Basic concepts and theoretical approaches are considered, including dimensional analysis, and thus features of the sources deduced. It is found that fans produce both tonal and random noise. While the sources of the tonal noise are several, they can be defined quite specifically, and consist mainly of regular lift fluctuations created on individual blades by inflowing distortions. For the exceptional case of supersonic relative velocity, the tonal noise is dominated by the steady pressure field relative to the blade row becoming at high supersonic speeds, a shockwave-expansion pattern. The significant sources of broad band noise are less well defined but could be produced equally well by self-excited phenomena on blade rows.

AGARD Lecture Series, Aerodynamic Noise, at von Karman Inst Meet, Rhode St., Genese, Belgium, December 6-9, 1976.

Lowrie, BW (Rolls-Royce Limited)
Advisory Group for Aerospace Res & Dev-NATO No. 80, Paper 5, Jan. 1977, 21 pp, 21 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172762
GROUND MONITORING OF AIRCRAFT NOISE
The author briefly reviews the history of aircraft noise monitoring, and then examines three different approaches that have been used in deciding on noise level standards for aircraft. One of these, recently introduced by the State of California, includes the concept of single flight monitoring, and the monitoring of a noise impact boundary. Aircraft operational procedures and their effect on noise are also discussed, and the future trends in aircraft noise monitoring are briefly outlined.

Large, JB (Southampton University, England) *Noise Control, Vibration Isolation* Vol. 7 No. 5, May 1976, pp 151-157, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172792
EFFECTS OF CRUISE-ALTITUDE POLLUTION
This paper presents a brief, relatively nontechnical summary of present understanding of the environmental effects of aircraft emissions during high-altitude-cruise operation. It is shown that the effects of nitric oxide and water on ozone are relatively well established, but that the possible climatic consequences of emissions are, at best, poorly understood.

Broderick, AJ (Transportation Systems Center) *Journal of Aircraft* Vol. 13 No. 10, Oct. 1976, pp 817-822, 19 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 172819
SUGGESTED CHANGES IN CURRENT NOISE CERTIFICATION PROCEDURES FOR COMMERCIAL TRANSPORT AIRCRAFT
Based on the experience acquired at Douglas in DC-9 and DC-10 noise certification programs, and on the results of aircraft noise research conducted within and outside the Company, several opportunities have been identified for controlling certification costs without compromise of national noise abatement objectives. These opportunities involve expansion of the allowable temperature-humidity test window, expanded use of acoustical analysis rather than flight testing, and simplification in the determination of maximum sideline noise levels. Recommendations are presented for appropriate action needed to develop and implement improved procedural requirements.

Prepared for SAE Meeting, August 9-12, 1976.

Fish, EB, Jr (Douglas Aircraft Company, Incorporated) Haight, NL
Society of Automotive Engineers Preprint SAE 760615, 1976, 7 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 173480
PROBLEMS IN PREDICTING AIRCRAFT NOISE EXPOSURE
For more than twenty years, the aviation industry has tried to develop a single universal rating method which would accurately describe the noise produced by aircraft operations in terms of the subjective reaction of the exposed population. Some of the basic assumptions involved in this procedure are examined. Also offered are suggestions for improvement in the methodology and potential areas of study.

Odell, AH (Port Authority of New York and New Jersey) *Noise Control Engineering* Vol. 9 No. 1, July 1977, pp 32-37, 21 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 173482
EVALUATION OF PROPOSED STANDARDS FOR AIRCRAFT FLYOVER NOISE ANALYSIS SYSTEMS
A unique test is discussed in which identical tape recordings of aircraft flyover noises were analyzed by 12 different organizations in the United States and Europe to determine the degree of uniformity in data analysis that could be achieved. Although all organizations did not use the same analysis system, each system conformed to standard specifications proposed by a Society of Automotive Engineers (SAE) Instrumentation and Analysis Subcommittee. The purpose of the test was to evaluate the proposed standard. The statistical analyses of the test results are presented. Also described are the proposed standard, the elements of the evaluation test, and the analysis systems used.

Stouder, DJ (McDonnell Douglas Corporation) McCann, JC *Journal of Aircraft* Vol. 14 No. 8, Aug. 1977, pp 713-719, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 173494
CURRENTS AND CONTAMINANT DISPERSION IN THE NEARSHORE REGION AND MODIFICATION BY A JETPORT
The steady-state and the time-dependent, constant density, wind-driven currents in the near-shore Cleveland area of Lake Erie, under present conditions and as modified by the proposed Lake Erie International Jetport, were calculated numerically. Two specific jetport configurations were studied in detail: an island, and an island with causeway to shore. Coupling procedures between the fine near-shore numerical grid and the coarse overall-lake grid were studied in detail and are presented here. For the jetport configuration, several computations illustrating the dispersion of a contaminant from a point source into Lake Erie were made. For the particular cases studied, it is shown that the island does not significantly modify the currents or contaminant dispersion while the island with a causeway to the shore does. The near-shore numerical models presented here can be easily modified to study the near-shore dispersion in other large lakes.

Sheng, YP (Case Western Reserve University) Lick, WJ *Journal of Great Lakes Research* Vol. 2 No. 2, 1976, pp 402-414

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 173821
INTEGRATED NOISE MODEL
The objective of this report is to familiarize the reader with the capabilities and characteristics of the Integrated Noise Model (INM). The INM is a noise-simulation computer-based tool for describing and defining the impact of aircraft noise around an airport. It is useful in assessing actual or predicted airport noise impacts. The INM takes into account all pertinent impact parameters including types and numbers of aircraft operating at the airport, flight tracks, operating procedures, and time of day aircraft operations. The INM will also provide a better understanding of aircraft noise, the need for the INM, and its potential applications.

Federal Aviation Administration Apr. 1978, 12 pp, 5 Fig., 1 App.

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

07 173839
COMMUNITY REACTIONS TO THE CONCORDE: AN ASSESSMENT OF THE TRIAL PERIOD AT DULLES AIRPORT
This study addressed two general questions: what has been learned about the changes in the noise environment and about the reactions of people around Dulles airport toward those changes? What has been learned about the design and operation of the monitoring program during the Dulles trial that could be used to improve any similar program in the future? The study findings which are derived from data collected by the Federal Aviation Administration (FAA) from its noise monitoring, community opinion survey and complaint collection programs are tabulated. The data from the FAA's monitoring program are compatible with predictions that would be made on the basis of existing knowledge about aircraft noise and resulting community response. For communities in the Dulles survey sample, there is a general relationship among the cumulative noise levels for all aircraft operations, the percentage of survey respondents who reported that they had heard the Concorde, the annoyance with aircraft noise expressed by survey respondents, the reported attitudes toward the Secretary's decision, and spontaneous complaints about the Concorde. A new phenomenon associated with the Concorde is the high level of low-frequency noise. Further results are discussed, and it is noted that the data reinforce confidence in the validity of the cumulative noise descriptors for prediction of the changes in people's annoyance with aircraft noise.

National Research Council 1977, 17 pp, 2 Tab.

ORDER FROM: National Academy of Sciences, 2101 Constitution Avenue, NW, Printing and Publishing Office, Washington, D.C., 20418

07 173868
AIRCRAFT AND THE ENVIRONMENT
An attempt is made to bring together the many ways in which aviation is beneficial to the environment and, may even be considered to enhance it. The influence of the aircraft on the biological-ecological factors of man's environment are outlined, and its influence on the technological factors is reviewed. The aircrafts' efficiency as a people-mover, pollution spotter, and bulk hauler and the spin-off benefits of aviation research are noted. Economic aspects such as aircraft productivity, and how the aircraft interacts with the daily life of people are also discussed. Social-cultural benefits are discussed although such benefits are difficult to measure.

Federal Aviation Administration June 1974, 13 pp

ACKNOWLEDGMENT: Federal Aviation Administration

07 173869
A GUIDE FOR COMPREHENSIVE LAND USE PLANNING AROUND AIRPORTS IN SOUTH CAROLINA
This manual provides guidance to local sponsors (cities, counties, and airport districts) in meeting Federal Aviation Administration requirements to take steps to ensure compatible land use adjacent to existing or planned airports. The growth of aviation, the South Carolina Airport System Plan and emerging problems are briefly reivewed. The origin of land use conflicts, land uses compatible and non compatible with airports, and aircraft noise are discussed. Comprehensive planning, master planning, and integrated planning are considered, and the airport's impact on land use are analyzed. Land acquisition, easments, advance property acquisition, land use zoning, limitations on zoning, airport height limitation zoning, exclusive zoning, subdivision regulations, building codes, community improvements, and needed legislation are also covered.

Smith (Wilbur) and Associates Final Rpt. SC-40-0014-1098, July 1976, 22 pp, 5 App.

Contract 1032-11-G

ACKNOWLEDGMENT: South Carolina Aeronautics Commission
ORDER FROM: South Carolina Aeronautics Commission, P.O. Box 1769, Columbia, South Carolina, 29202

07 174341
BELGIUM'S LARGEST WATER RECYCLING PLANT OPERATED AT BRUSSELS NATIONAL AIRPORT
This article describes the water purification and recycling plant located at Brussels National Airport. The plant was required because of the need to eliminate toxic substances resulting from technical overhaul activities, the shortage of pure water for special industrial purposes and, regulations governing the discharge of toxic substances required SABEWS to equip itself

with a water purification facility. The plant operates on the closed-cycle principle, water used by the workships is pumped through a specially designed pipe and once purified is returned to the shops for re-use. The various stages of the purification process are manually or automatically checked by means of electronic sensors. The effluent is not discharged into the sewer system until a final automatic check has been made. It is expected that the next stage will be the purification of lubricating oil and solvents from workships. The construction of a water purification plant associated with the cleansing of airframes to combat corrosion is being contemplated as well as using this recycled water for feeding the boilers of the heating system. In the long-run, a policy of rain water re-use is expected to be pursued. This would enable Brussels National Airport to become independent of the city water supplies, as far as industrial purposes are concerned.

ICAO Bulletin Vol. 33 No. 1, Jan. 1978, pp 28-29, 1 Phot.

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, 1080 University Street, Montreal 101, Quebec, Canada

07 174484
AIR QUALITY ASSESSMENT FOR AIR FORCE OPERATIONS-LONG-TERM EMISSION/DISPERSION COMPUTER CODE DOCUMENTATION

The Air Force contracted with Argonne National Laboratory to develop a series of computer programs designed to assess the air quality impact of Air Force operations at the airbase level. This report serves as a computer code documentation manual for the long-term emission/dispersion model of that effort. Descriptions of the computer codes corresponding to both the original version called the Research Model and the modified version called the Applications Model of the Long-Term Model are included. The manual contains flow charts, code listings, and brief descriptions of each routine contained in the model. It is intended primarily for readers with a computer programming background who wish to examine or alter the computer codes.

Bingaman, DJ
Argonne National Laboratories, (1900) Final Rpt. CEEDO-TR-76-35, Apr. 1977, 251 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047296/9ST

07 174580
POLLUTION REDUCTION TECHNOLOGY PROGRAM FOR SMALL JET AIRCRAFT ENGINES, PHASE 1

A series of combustor pressure rig screening tests were conducted on three combustor concepts applied to the TFE731-2 turbofan engine combustion system for the purpose of evaluating their relative emissions reduction potential consistent with prescribed performance, durability, and envelope contraints. The three concepts and their modifications represented increasing potential for reducing emission levels with the penalty of increased hardware complexity and operational risk. Concept 1 entailed advanced modifications to the present production TFE731-2 combustion system. Concept 2 was based on the incorporation of an axial air-assisted airblast fuel injection system. Concept 3 was a staged premix/prevaporizing combustion system. Significant emissions reductions were achieved in all three concepts, consistent with acceptable combustion system performance. Concepts 2 and 3 were identified as having the greatest achievable emissions reduction potential, and were selected to undergo refinement to prepare for ultimate incorporation within an engine.

Bruce, TW Davis, FG Kuhn, TE Mongia, HC
AiResearch Manufacturing Company Final Rpt. NASA-CR-135214, Sept. 1977, 177 pp

Contract NAS3-18560

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33168/4ST

07 174586
AIRPLANE NOISE: DIMENSIONS AND MEANS OF NOISE REDUCTION

An estimate was made of the number of people exposed to noise from military and civil aircraft in Norway. Possibilities for the reduction of noise exposure are reviewed and costs are estimated for various alternatives.
In Norwegian; English Summary.

Ringheim, M
Technical University of Norway ELAB-STF44-A75080, ISBN-82-595-696-3, Oct. 1976, 13 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33696/4ST

07 174597
EFFECT OF FORWARD MOTION ON ENGINE NOISE

Methods used to determine a procedure for correcting static engine data for the effects of forward motion are described. Data were analyzed from airplane flyover and static-engine tests with a JT8D-109 low-bypass-ratio turbofan engine installed on a DC-9-30, with a CF6-6D high-bypass-ratio turbofan engine installed on a DC-10-10, and with a JT9D-59A high-bypass-ratio turbofan engine installed on a DC-10-40. The observed differences between the static and the flyover data bases are discussed in terms of noise generation, convective amplification, atmospheric propagation, and engine installation. The results indicate that each noise source must be adjusted separately for forward-motion and installation effects and then projected to flight conditions as a function of source-path angle, directivity angle, and acoustic range relative to the microphones on the ground.

Blankenship, GL Low, JKC Watkins, JA Merriman, JE
Douglas Aircraft Company, Incorporated NASA-CR-134954, MDC-J7708, Oct. 1977, 198 pp

Contract NAS3-20031

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-10093/0ST

07 174605
CONCORDE NOISE-INDUCED BUILDING VIBRATIONS: INTERNATIONAL AIRPORT DULLES

A series of studies were conducted to assess the noise-induced building vibrations associated with Concorde operations. The vibration levels of windows, walls, and floors were measured along with the associated noise levels of Concorde, subsonic aircraft and some nonaircraft events. Test sites included Sully Plantation which is adjacent to Dulles International Airport and three residential homes located in Montgomery County, Maryland. The measured vibration response levels due to Concorde operations were found to be: (1) higher than the levels due to other aircraft, (2) less than the levels due to certain household events which involve direct impulsive loading such as door and window closing, (3) less than criteria levels for building damage, and (4) comparable to levels which are perceptible to people.

Mayes, WH Scholl, HF Stephens, DG Holliday, BG Deloach, R
Langley Research Center Final Rpt. NASA-TM-74083, Sept. 1977, 19 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-10839/6ST

07 174691
AIRCRAFT EMISSION FACTORS

In order to perform useful air quality analysis it is necessary to have the most accurate emission factor data available. This report provides updated aircraft engine emission factors and a sample of the calculation methodology used in obtaining these numbers. Modal emission factors have been calculated for a number of gas turbine and piston aircraft engines. Emission factors per aircraft per landing take-off cycle have been calculated for representative aircraft-engine combinations. This group includes commercial jet transports, business jets, turboprops and general aviation piston aircraft.

Pace, RG
Environmental Protection Agency Tech Rpt. AX-77-03, Mar. 1977, 29 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-275067/7ST

07 174876
ENVIRONMENTAL IMPACT STATEMENT FOR BICENTENNIAL INTERNATIONAL AIRPORT NORTHEAST, AMERICA. MODEL ENVIRONMENTAL IMPACT STATEMENT NUMBER 1

This model describes a hypothetical air carrier airport at which the development of a new 10,000-foot parallel runway is proposed. The document describes the project, the purpose, and the setting. It includes background information including the project history and community involvement. Fifteen impact categories are analyzed together with a description of measures to be taken to minimize adverse effects. Emphasis in this case is given to noise impacts, direct socioeconomic effects (especially relocation of 130 families) and replacement of a public playground. The latter involves application of the Department of Transportation Act Section 4(f). Alternatives to the proposed runway are included in the environmental impact statement. Letters received from Federal agency review are included in the document as are responses to comments. Also included in the document is a sample decision paper and Federal Finding. (Author)

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AAP-78-2-1, Nov. 1977, 351 pp

Contract DOT-FA75WA-3703

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049171/2ST

07 174877
ENVIRONMENTAL IMPACT STATEMENT FOR INDEPENDENCE AIRPORT SOUTHWEST, AMERICA. MODEL ENVIRONMENTAL IMPACT STATEMENT NUMBER 3

This hypothetical model environmental impact statement describes the proposed development of a new general aviation airport in a rural area. The purpose of the project is included and alternative sites considered are described. The setting is in a rural highly productive farming area and is included in the description. Of the several environmental impact categories included in the assessment, the principal factors considered involved the effects of noise on a nearby historic site, protection of habitat of an endangered species, displacement of two families, and relocation of access to a Boy Scout camp. Coordination of the assessment report with State and local agencies is simulated to add realism. A draft environmental impact statement was actually sent to several Federal agencies for comment, with the results included in the text. (Author)

See also AD-A049 299.

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AAP-78-2-3, Nov. 1977, 195 pp

Contract DOT-FA75WA-3703

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049172/0ST

07 174884
NEGATIVE DECLARATION SECTION 16(C) (4) COORDINATION FOR LIBERTY AIRPORT, NORTHWEST, AMERICA (MODEL ENVIRONMENTAL IMPACT STATEMENT NUMBER 4)

This model represents the least complex of the four model environmental impact statements in this series. This document which describes expansion of a general aviation airport in a rural setting does not involve significant impacts on the quality of the human environment and has undergone only limited coordination pursuant to the requirements of Section 16(c) (4) of the Airport and Airway Development Act of 1970, as amended. The impacts of the proposed development are described as minimal. However, a number of points raised in the review by the Department of the Interior led to clarification and some additional information in the text along with responses to each comment given. (Author)

See also Rept. nos. FAA-AP-77-1, AD-A039 274 and FAA-AP-77-1A, AD-A039 465.

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AAP-78-2-4, Nov. 1977, 100 pp

Contract DOT-FA75WA-3703

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049299/1ST

07 174885
ENVIRONMENTAL IMPACT STATEMENT FOR FREEDOM AIRPORT, SOUTHEAST, AMERICA. MODEL ENVIRONMENTAL IMPACT STATEMENT NUMBER 2

This model covers site selection and development of a new general aviation airport to serve as a reliever for a major air carrier airport in a metropolitan area. The environmental impact statement includes sections on the project itself and its purpose, a summary of the site selection process and related actions, and an assessment of fifteen impact categories. The document also describes alternatives considered in the process and measures to be taken to minimize adverse effects. Office of Management and Budget Circular A-95 coordination results are included, as are the results of Federal agency review of a draft. This hypothetical airport project involves development of a site which requires filling in a portion of a bay and displacement of a mobile home trailer park. Emphasis is placed on marine biology, recreational uses of the bay, and coastal zone considerations. (Author)

See also Rept. nos. FAA-AP-77-1, AD-A039 274 and FAA-AP-77-1A, AD-A039 465.

Greiner Environmental Sciences Incorporated Final Rpt. FAA-AAP-78-2-2, Nov. 1977, 269 pp

Contract DOT-FA75WA-3703

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049300/7ST

07 174999
THE ENVIRONMENTAL ANALYSIS OF HELICOPTER OPERATIONS BY FEDERAL AGENCIES: CURRENT PROCEDURES AND RESEARCH NEEDS

The technical, economic, and environmental problems restricting commercial helicopter passenger operations are reviewed. The key considerations for effective assessment procedures are outlined and a preliminary model for the environmental analysis of helicopters is developed. It is recommended that this model, or some similar approach, be used as a common base for the development of comprehensive environmental assessment methods for each of the federal agencies concerned with helicopters. A description of the critical environmental research issues applicable to helicopters is also presented.

Smith, CC Warner, DB Dajani, JS
Duke University NASA-CR-145238, Aug. 1977, 62 pp

Grant NSG-1121

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-11519/3ST

07 175360
AIRCRAFT SONIC BOOM: BIOLOGICAL EFFECTS (A BIBLIOGRAPHY WITH ABSTRACTS)

The selected abstracts of research reports cover the effects of sonic booms on humans, animals, birds, and fish. Discussions of biophysics, psychoacoustics, stress, and auditory tolerances are presented, along with materials on startle responses, disturbance, and compression wave reactions. (This updated bibliography contains 77 abstracts, 5 of which are new entries to the previous edition.)

Supersedes NTIS/PS-77/0171, NTIS/PS-0177 and NTIS/PS-75/320.

Harrison, EA
National Technical Information Service Feb. 1978, 82 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-78/0120/2ST

07 175458
HIGH ALTITUDE POLLUTION PROGRAM A STATUS REPORT PREPARED IN ACCORDANCE WITH PL 95-95

The past and planned activities of the High Altitude Pollution Program (HAPP) are summarized. A preliminary HAPP assessment of the stratospheric effects from aviation indicates that there is no imminent threat of ozone reduction from any type of existing aircraft, though substantial uncertainties still remain to be unravelled. (Author)

Sundararaman, N
Federal Aviation Administration FAA-AEQ-77-16, Dec. 1977, 36 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051129/5ST

07 175529
ATMOSPHERIC-ABSORPTION ADJUSTMENT PROCEDURE FOR AIRCRAFT FLYOVER NOISE MEASUREMENTS
An analytical method was developed for adjusting measured aircraft noise levels for differences in atmospheric absorption between test and reference meteorological conditions along the sound propagation path. The method is based on the procedure in the proposed American National Standard ANS S1.26 for calculating pure-tone sound absorption as a function of the frequency of the sound and the temperature, humidity, and pressure of the air. Measured aircraft noise levels are assumed to be 1/3-octave-band sound pressure levels. A computer program was written in FORTRAN IV to carry out the calculations. The operation of the computer program, the required input data, and all symbols and terms used in the program are described. A program listing of source statements is provided. Recommendations are given for applying the method to routine processing of aircraft noise measurements. (Author)

Marsh, AH
Dytec Engineering Incorporated Final Rpt. FAA-RD-77-167, DY-TEC-R-7705, Dec. 1977, 90 pp

Contract W1-77-5660-1

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051700/3ST

07 177368
HANDBOOK OF NOISE AND VIBRATION CONTROL. 3RD EDITION
The third edition of the handbook, devoted to the control of industrial noise and vibration, contains information on the cause, effect, measurement, acceptable levels and methods of control of man-made noise. The information is presented in the following sections: (1) fundamentals and principles; (2a) measurement, analysis and recording; (2b) practical noise control; (2C) practical vibration control; (2D) noise in buildings; and (2e) environmental noise (including aircraft, road traffic and construction equipment noise levels). /TRRL/

Trade and Technical Press Limited, (0 85461 507X) Monograph 1977, 723 pp, Figs., Tabs., Phots.

ACKNOWLEDGMENT: TRRL (IRRD-231342)
ORDER FROM: Trade and Technical Press Limited, Crown House, Morden, Surrey, England

07 178070
AIRPORT/COMMUNITY ENVIRONMENTAL PLANNING
An analysis of recent airport environmental planning practices shows that they have been fundamentally misdirected. Emphasis on the preparation and review of Environmental Impact Statements by governmental agencies with narrow aviation perspectives has resulted in widespread litigation and controversy. A new approach is needed, one that leads to a closer integration of airport planning and comprehensive urban planning. A systematic definition for the term "environment" serves as the basis for such an approach.

Orlick, SC (California Polytechnic State University) *ASCE Journal of Transportation Engineering* Vol. 104 No. 2, Mar. 1978, pp 187-199

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 178144
ENERGY APPROACH TO ECOLOGICAL IMPACT ASSESSMENT
This paper was prepared to educate the transportation planner/engineer in some of the rudiments of ecology and with the hope of systematizing current approaches to ecological assessment. Considerations of energy, or bio-energetics, have been found to be singularly applicable to transportation impact assessment. This method of evaluating the effects of environmental impacting factors on environmental elements is outlined herein. The method can be applied to the analysis of the ecological impact of all types of activities, and with particular pertinence to transportation. The energy theory is based on analysis of the amount of energy which is required by plants or animals or ecosystems or subsystems, to permit their growth or stability to continue. The numerical calculations involved permit quantification of impact effects of transportation facilities.

Cantilli, EJ (Polytechnic Institute of New York) Hair, M Cassin, JM Falcocchio, JC *Journal of Environmental Systems* Vol. 7 No. 3, 1977, pp 243-256

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 178257
WHAT'S ALL THE NOISE ABOUT?
Light aircraft noise is a growing problem, so much so that internationally proposed noise limits are expected to be enforced in many countries before long. This article highlights the main themes of a conference on light aircraft noise.

Barnett, C *Flight International* Vol. 113 No. 3610, May 1978, p 1595

ACKNOWLEDGMENT: Flight International
ORDER FROM: IPC Transport Press

07 178262
NOISE LEVELS OF JET TRANSPORT AIRCRAFT DURING INITIAL CLIMB
This report contains noise peak level data measured for 27 jet transport departure flights at minimum slant range distances of between 305m and 1830m. The noise data, in D-weighted sound levels, dB(D), were obtained by analysis of noise history tape recordings each of which was accompanied by a photographic record of the flight track. Propagation laws, relating peak sound level and minimum slant range, are derived for ten different aircraft types and for two categorised groupings (2-engined turbofan and 4-engined turbofan aircraft). Directivity properties of the D-weighted sound level of selected aircraft are also derived from the sound history and photographic records.

Lanzer, M Brown, D Ollerhead, JB
Loughborough University of Technology, England TT Rpt 7702, Mar. 1977, 35 pp, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 178265
TTS FROM NEIGHBORHOOD AIRCRAFT NOISE
Tape-recorded overpasses of aircraft noise, both landings and takeoffs, were reproduced at 111 dBA peak level in a reverberant room in an attempt to determine the effect on the auditory threshold of the worst exposure to such noise that would reasonably be expected near an airport. The mean temporary threshold shift two minutes after exposure did not reach 5 dB at any frequency in any condition, suggesting that hearing damage would be only a remote possibility from such exposures. The importance of interruptions in reducing the risk is emphasized.

Ward, WD (Minnesota University, Minneapolis) Cushing, EM Burns, EM *Acoustical Society of America, Journal of* Vol. 60 No. 1, July 1976, pp 182-185, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 178460
ENVIRONMENTAL AIRPORT REGULATIONS
The author addressed two topics in this paper. One is a general overview of the current regulation of the Federal Aviation Administration (FAA) containing the environmental requirements relative to airport development and how this regulation is different in several important respects from the previous one. The second topic is noise--the major environmental problem facing U.S. airports today--and what kinds of steps have been taken recently to tackle this problem.
ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C April 4-6, 1977.

Goodwin, JR (Federal Aviation Administration)
American Society of Civil Engineers Proceeding 1977, pp 105-118

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 178465
AIRPORT NOISE REDUCTION--WHAT NEXT?
Two major issues important to the future of airport neighborhood noise levels have recently been resolved. The International Civil Aviation Organization (ICAO) has agreed upon noise certification requirements for future transport aircraft, and the Federal Aviation Administration (FAA) has promulgated a rule requiring that the current domestic subsonic jet transport fleet be brought into compliance with Federal Aviation Regulation (FAR) Part 36 by 1985. FAA also announced its intention to pursue a similar rule for the current international fleet. It is not unexpected then that whose wishing to achieve further noise reduction in communities around airports will turn their attention to other means. This leads directly to the idea of achieving compatibility through the certification of individual airports for noise. The Environmental Protection Agency has already proposed an airport noise regulatory process. The purpose of this paper is to suggest some of the implications of certifying individual airports for noise. Included is an assessment of the noise reductions that may be expected from new technology aircraft.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

McPike, AL (Douglas Aircraft Company, Incorporated)
American Society of Civil Engineers Proceeding 1977, p 347, 13 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 179388
CALCULATIONS OF MAXIMUM A-WEIGHTED SOUND LEVELS (DBA) RESULTING FROM CIVIL AIRCRAFT OPERATIONS
This document presents a procedure for calculating and documenting in an environmental impact statement or negative declaration the maximum A-weighted sound level for single aircraft operations at specified noise-sensitive locations in the vicinity of civil airports. This procedure will enable Air Traffic and Flight Standards personnel to calculate the maximum A-weighted sound level resulting from aircraft takeoff or landing at any specified ground location in the vicinity of an airport. This guidance material includes aircraft flight profile information by aircraft type and mode of operation, and peak noise level as a function of slant range to the aircraft. This procedure is not intended for developing noise contours around an entire airport or for calculating the maximum sound levels at numerous points. This document also includes an appendix that discusses the impact of noise on people and case studies for Air Traffic and Flight Standards personnel.

Federal Aviation Administration June 1978, 65 pp, Figs., Tabs.

ACKNOWLEDGMENT: Federal Aviation Administration
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

07 179875
AIRPORT NOISE: THE ROLE OF THE PUBLIC OFFICIAL
This article presents some fundamental factors relevant to airport noise controversies and suggests possible solutions to the problem. The first fundamental is that airplane noise cannot readily be compared to most other noise because it is not only sound that is important but also fear and other psychological reactions that sound produces. Airplane noise, it is noted, is really only a catchword for a larger underlying problem such as the effects planes have on the character of the neighborhood and property values. The second fundamental is that a perfect solution would require the adoption of an unacceptable extreme. An examination of the theoretical possibilities for the eradication of airport noise shows that either of two approaches can, if carried to extremes, be used to reduce the problem of aircraft noise to zero. Many anti aviation residents believe the solution lies in prohibitive legislation, regulation and judicial orders. Some aviation groups have attempted to reduce the noise emitted from the aircraft they fly. In airport noise debates, responsible government officials are required to make difficult decisions among competing priorites and values and they are not necessarily wrong just because one side doesn't happen to agree with the results. It is important, regardless of what is decided, that each side be given a full chance to be heard and to participate. Utilimately, both sides must finally realize that some compromise must be effected if anything worthwhile is ever to be accomplished.

Yasgur, SS *Airport Services Management* Vol. 18 No. 7, July 1978, pp 14-17

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

07 179885
DESIGN OF NOISE MONITORING SYSTEMS
The author reviews the main considerations in designing systems for measuring noise at airports, and describes a monitoring installation at Prague. It is noted that in deciding which noise rating index to use, due consideration must be given to the prime noise source in the area and the type of district. The rating index should also reflect the variation of the noise level with respect to time. Having decided on the parameters to be measured, consideration should be given to the duration of the measurement. If it is to be taken over a short period than a system could be constructed on a hybrid basis from standard instruments and placed in an all-weather enclosure. Whether it is a custom design or a hybrid system the one item which is common to both is the microphone and this represents one of the major problems. The protection of the microphone is difficult to achieve because by definition, it must be exposed to the atmosphere and if therefore vulnearable to various environmental effects. A typical hybrid environmental noise monitoring station for an airport application is described as is the error detection system.

Campbell, I *Airports International* No. 67, June 1978, pp 49-52, 2 Fig.

ACKNOWLEDGMENT: Airports International
ORDER FROM: IPC Transport Press

07 180122
NOISE BURDENS AT US AIRPORTS
An assessment of the magnitude of the community impact of aircraft noise in the year 1975 is made through a study of 52 U.S. airports. The calculations are based upon a simplified prediction model. It is estimated that in that year approximately 2.5% of the national population would have been seriously annoyed by the noise of commercial aircraft operations. The good neighborliness of airports is assessed in terms of the noise burden factor which is defined as the number of man-days of annoyance per passenger movement. Nearly 50% of the sample yield factors of less than 1.0 which is suggested as a reasonable planning target. The effect of the introduction of the larger, quieter wide-bodied aircraft is estimated to more than halve average noise burden factors between the years 1970 and 1975.

Deva-Aditya, NJ Ollerhead, JB
Loughborough University of Technology, England TT-7703, Mar. 1977, 59 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N77-29650)
ORDER FROM: NTIS

07 180124
CRITERIA FOR ASSESSING THE ACCEPTABILITY OF AIRPORT NOISE NUISANCE. VOLUME 1--THE ROLE OF SOCIAL JUSTICE
Research into community noise problems has provided methods by which environmental planners may estimate the total impact of a given noise exposure. The special problem of aircraft noise nuisance with respect to notions of social justice is discussed. The general role of social justice in contemporary policy-making (the actual position) is compared with the ideal notions of justice which would be defined in an ideal world (the original position). The variation between this ideal notion and other notions of justice applicable to the airport conflict (airport position) are also discussed in the relation to airport policy-making.

Deva-Aditya, NJ
Loughborough University of Technology, England TT-7503-V1, Feb. 1976, 32 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N77-29652)
ORDER FROM: NTIS

N77-29652

07 180125
CRITERIA FOR ASSESSING THE ACCEPTABILITY OF AIRPORT NOISE NUISANCE. VOLUME 2--APPLICATION OF SOCIAL JUSTICE PRINCIPLES
The airport conflict (its effect on society) within a dimension of justice is examined and relevant facets are identified with respect to several contemporary notions of social justice. Application of some social justice principles to the problems of airport noise and airport planning policies is made.

Deva-Aditya, NJ
Loughborough University of Technology, England TT-7503-V2, Feb. 1976, 78 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N77-29653)
ORDER FROM: NTIS

N77-29653

07 180126
CHANGES IN GROUND NOISE LEVELS OF GENERAL AVIATION AIRCRAFT DERIVED FROM CHANGES IN COCKPIT NOISE LEVELS
It is suggested that measurements of changes in cockpit (cabin) noise levels can be used to estimate the noise levels associated with various power settings of general aviation aircraft in their operations about an airport. Data on cabin noise levels during takeoff and landing would be used to adjust data obtained under a standard 1000-ft high power condition so that it would apply to climb, cruise, and other conditions. Changes in cabin sound levels as a function of flight condition are presented for a single-engine type and a twin-engine type aircraft. Ground measurements of noise changes were obtained for one of the aircraft types in order to test the validity of the procedure.

Curtis, GD (Darby (RA) and Associates) *Acoustical Society of America, Journal of* Vol. 62 Oct. 1977, 2 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-11488)
ORDER FROM: AIAA

A78-11488

07 180128
AIRCRAFT NOISE CONTROL
This paper summarizes the impact of airport noise on people residing in the vicinity of airports and estimates the noise control requirement to reduce the severity of the existing impact. Several of the significant options of comprehensive noise control program are reviewed relative to this requirement, with emphasis being given to source control. It is concluded that all available and practicable noise control methods must be fully exercised to begin a reduction of noise for airport neighbors with the promise of increasing relief over the next twenty years.

Inter-Noise 77, Noise Control-The Engineers Responsibility; Proceedings of the Sixth International Conference, Zurich, Switzerland, March 1-3, 1977. (A78-12812 02-71).

Eldred, KM (Bolt, Beranek and Newman, Incorporated)
International Inst of Noise Control Engineering Proceeding 1977, p A123

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12814)
ORDER FROM: AIAA

A78-12814

07 180129
NOISE ABATEMENT AT GENERAL AVIATION AIRPORTS-A REGULATORS DILEMMA
Conflicts between land use policy and noise abatement procedures instituted at general aviation airports in Massachusetts are discussed. The noise levels at which complaints from residents of the airport vicinity occur are given for both touch-and-go training operations and normal arrivals and departures. In addition, the effect of reducing noise exposure levels by five to nine decibels, the reduction required to eliminate residents' complaints, is assessed. Modified definitions of unacceptable noise levels and the development of mechanisms to control land use around airports are also considered.

Inter-Noise 77 Noise Control-The Engineers Responsibility; Proceedings of the Sixth International Conference, Zurich, Switzerland, March 1-3, 1977. (A78-12812 02-71).

Harris, AS (Bolt, Beranek and Newman, Incorporated)
International Inst of Noise Control Engineering Proceeding 1977, p B621

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12821)
ORDER FROM: AIAA

A78-12821

07 180131
STATUS OF AIRCRAFT NOISE CONTROL IN ISRAEL
A master plan for the equitable sharing of airspace, land and rights in the vicinity of Ben-Gurion International Airport, Israel, is described. Noise abatement procedures for aircraft, the introduction of zoning restrictions, the enactment of noise abatement flight regulations, urban planning and the acoustic treatment of residential buildings, and the monitoring and control of aircraft noise levels in communities surrounding the airport are discussed.

Inter-Noise 77, Noise Control-The Engineers Responsibility, Proceedings of the Sixth International Conference, Zurich, Switzerland, March 1-3, 1977. (A78-12812 02-71).

Moses, N Zeitlin, O (Ministry of Interior, Environ Protect Serv, Israel)
International Inst of Noise Control Engineering Proceeding 1977, p B634

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12823)
ORDER FROM: AIAA

A78-12823

07 180132
HELICOPTER NOISE PLANNING IN LONDON
Noise control procedures instituted at an expanding heliport facility in a mixed urban/industrial area are discussed. As a measure of overall noise exposure in the vicinity of the heliport, the noise and number index is adopted; the problem of balancing the average noise level and the number of helicopter movements to achieve a specified noise exposure riding is considered. Limitations on the number of movements per year at the heliport and on the noise of individual helicopters are proposed.

Inter-Noise 77,Noise Control-The Engineers Responsibility; Proceedings of the Sixth International Conference, Zurich, Switzerland, March 1-3, 1977. (A78-12812 02-71).

Simson, J Deva-Aditya, NJ (Greater London Council)
International Inst of Noise Control Engineering Proceeding 1977, p B652

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-12826)
ORDER FROM: AIAA

A78-12826

07 180140
RESEARCH INTO EFFECTS OF AIRCRAFT NOISE ON HEARING OF CHILDREN IN EXPOSED RESIDENTIAL AREAS AROUND AN AIRPORT
One hundred children living in the preferred direction of takeoff area within one mile of Heathrow Airport, UK were given hearing tests in a sound-treated audiometric room. The investigation revealed ten subjects with slight to moderate high-frequency loss of sensorineural origin. In a control study of 100 children from a selected quiet area, eight were found to suffer a similar hearing deficiency, indicating that aircraft noise probably has not caused a marked increase in the rate of hearing deficiencies in the experimental group. Difficulties in evaluating the prevalence and eitology of high-freqyency hearing losses in children are also mentioned.

Fisch, L (Hearing Clinic, England) *Acoustics Letters* Vol. 1 1977, 2 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (78A-18779)
ORDER FROM: AIAA

78A-18779

07 180157
THE DEVELOPMENT AND EVALUATION OF TWO SEGMENT APPROACH TECHNIQUES FOR AIRCRAFT LANDING NOISE REDUCTION
BAC 1-11 (201 series) short haul airliner powered by two Rolls Royce spey turbofan engines was used for the two segment approach studies. Attention

is given to the two segment profile, questions of guidance, the two segment approach computer, factors influencing approach accuracy, airframe and engine performance, the integration of two segment approaches with all weather operations, approach procedures, noise benefits, operational aspects, the evaluation of system performance, and pilot assessments.

From the International Conference on the Future of Aircraft All-Weather Operations, London, England, 23-26 November 1976. (A77-37701 17-04)

Lumsden, RB (Royal Aircraft Establishment, England) Collins, PH (Smith Industries, Limited)
Institution of Electrical Engineers Proceeding 1976, pp 57-62

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-37716)
ORDER FROM: AIAA

A77-37716

07 180184
CONVEX 76--AIRCRAFT NOISE AND AIR TRAFFIC CONTROL

It is suggested that most noise abatement programs impair the efficient use of aircraft, decrease flexibility of operation, and require aircraft to operate below optimum performance. Operational restrictions are listed, including minimum noise routings, use of reduced thrust on take-off, and power cutback on climb-outs. Minimum noise routes are described with regard to problems incurred in take-off and landing stages, and proposals by the National Air Traffic Services, the Civil Aviation Authority, and the Guild of Air Traffic Control Officers are reviewed.

Johnston, TS (Guild of Air Traffic Control Officers) *Controller* Vol. 16 Aug. 1977, pp 29-31

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-49225)
ORDER FROM: AIAA

A77-49225

07 180188
INSULATING BUILDINGS FROM AIRCRAFT NOISE

Field measurements of insulation against aircraft noise were made for a wide range of building components. Single-figure ratings of noise insulation were derived, and a design procedure for use of these ratings is presented. The dependence of the effective sound insulation on the spectral balance of aircraft noise is examined.

Quirt, JD (National Research Council of Canada) *Acoustical Society of America, Journal of* Vol. 63 No. 3, Mar. 1978, pp 823-831, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 180398
AIRCRAFT VORTEX EFFECTS ON GROUND LEVEL POLLUTANT CONCENTRATION

This paper investigates the changes in final results of airport air pollution prediction models by inclusion of wake vortex transport and whether the changes are of enough significance to warrant inclusion of the vortex transport in future uses of airport models.

Proceedings of the 70th Annual Meeting of the Air Pollution Control Associaiton, Toronto, Canada, June 20-24, 1977.

Delaney, BT (Exxon Research and Engineering Company) Ledbetter, JO
Air Pollution Control Association Paper 77-41, 1977, n.p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

07 180478
CONCORDE NOISE-INDUCED BUILDING VIBRATIONS, JOHN F. KENNEDY INTERNATIONAL AIRPORT

The outdoor/indoor noise levels and associated vibration levels resulting from aircraft and nonaircraft events were recorded at eight homesites and a school. In addition, limited subjective tests were conducted to examine the human detection/annoyance thresholds for building vibration and rattle caused by aircraft noise. Presented herein are the majority of the window and wall vibration data recorded during Concorde and subsonic aircraft overflights.

Mayes, WH Deloach, R Stephens, DG Cawthorn, JM Holmes, HK
Langley Research Center NASA-TM-78676, Feb. 1978, 67 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-20919/4ST

07 180489
SIMPLIFIED SONIC-BOOM PREDICTION

Sonic boom overpressures and signature duration may be predicted for the entire affected ground area for a wide variety of supersonic airplane configurations and spacecraft operating at altitudes up to 76 km in level flight or in moderate climbing or descending flight paths. The outlined procedure relies to a great extent on the use of charts to provide generation and propagation factors for use in relatively simple expressions for signature calculation. Computational requirements can be met by hand-held scientific calculators, or even by slide rules. A variety of correlations of predicted and measured sonic-boom data for airplanes and spacecraft serve to demonstrate the applicability of the simplified method.

Carlson, HW
Langley Research Center NASA-TP-1122, Mar. 1978, 50 pp

ACKNOWLEDGMENT: NTIS
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N78-20078/9ST

08 157939
THE LINK BETWEEN THE NEW MUNICH AIRPORT AND THE S-BAHN NETWORK [Der Anschluss des neuen Verkehrsflughafens Muenchen an das S-Bahnnetz Muenchen]
No Abstract. [German]

Werler, R *Die Bundesbahn* Vol. 53 No. 1, Jan. 1977, pp 15-24, 1 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

08 168578
OPTIMAL DISPATCHING OF AN INFINITE CAPACITY SHUTTLE: CONTROL AT A SINGLE TERMINAL
The optimal control of a shuttle system consisting of a single infinite capacity carrier transporting passengers between two terminals is studied. Passengers arrive according to independent Poisson processes, and dispatching decisions to hold the carrier for more passengers can be made at only one of the terminals. The objective is minimization of the long-run average of a linear passenger waiting cost and a fixed charge per trip made. When complete information about the system state is available, and travel times are deterministic, it is optimal to dispatch the carrier if, and only if, the total number of passengers waiting at both terminals is greater than a cutoff value. An iterative method for computation of the cutoff value is given and it is found that it can be well approximated by a function of system costs and parameters similar to the economic lot size formula. A (possibly non-optimal) dispatching rule is proposed for the case when only the number of passengers waiting at one terminal is known, and its efficiency is compared to that of the aforementioned optimal rule. Extensions to other optimality criteria and to the case of stochastic travel times are outlined.

The Rand Institute ceased operations in 1977.

Ignall, E Kolesar, P
Rand Institute P-4979, Mar. 1973, 36 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A044830/8ST

08 176651
ON THE CONFLICT FREQUENCY AT AIR ROUTE INTERSECTIONS
The paper extends previous results, and the number of crossing conflicts, at route intersections or route transitions, is shown to be expressable as a random sum of correlated random variables. This allows for a detailed derivation of the variance and approximate probability distribution for the number of crossing conflicts. Results indicate that the variance of the conflict frequency may be considerably larger than that obtained by the Poisson assumption. A numerical example is included with results compared to those of a numerical simulation of intersection conflicts.

Schmidt, DK (Purdue University) *Transportation Research* Vol. 11 No. 5, Oct. 1977, pp 351-355, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

08 176661
TANDEM-QUEUE ALGORITHM FOR AIRPORT USER FLOWS
A method is presented for relating, using simple functional notation, the cumulative arrival patterns of passengers at two successive sets of airport processing components. An algorithm is developed for the simplest case where all passengers go directly from one component to the next. In the algorithm there is provision for superimposing the arrival patterns of passengers of many different flights. The recursive equation of the algorithm is then generalized to accommodate more complex patterns of passenger flow with ancillary activities. A method is developed for estimating the total expected time spent between such processors as a function of the probability that passengers use particular ancillary activities, the associated dwell times at each, and the time spent going between activities. The overall algorithm is analytic and is intended for tying together deterministic queueing models of individual components so that the passenger flow through an entire airport can be analyzed.

Dunlay, WJ, Jr (Pennsylvania University, Philadelphia) Park, CH *ASCE Journal of Transportation Engineering* Vol. 104 No. 2, Mar. 1978, pp 131-149

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

08 176724
INTERMODAL PROBLEMS--THROUGH BILL OF LADING
An intermodal "through bill of lading" is the document by which regulated carriers accept and transport goods at specific rates between two or more points, using more than one mode. The purpose of the study is to determine the extent to which various types of intermodal "through bills of lading" are being used; define the need for intermodal through bills; identify documentation related impediments to efficient intermodal movement; and reduce transportation costs and increase overall transport efficiency by improvements in intermodal bills of lading and related procedures. The report indicates that additional work is necessary before optimum benefits can be realized through intermodal "through bills of lading". It is recommended that coordinated government-industry action be initiated to resolve many of the problems facing the shipping community.

The Interagency Committee on Intermodal Cargo is composed of staff members from the Civil Aeronautics Board, Federal Maritime Commission, Interstate Commerce Commission and Department of Transportation.

Civil Aeronautics Board No Date, n.p.

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Interagency Committee on Intermodal Cargo, Office of Facilitation, Department of Transportation, Washington, D.C., 20590

08 176739
SERVICE SEGMENT DATA
Service segment data is a system for collection of detailed traffic and operating data from the carriers on a monthly basis. The data collection system is composed of data banks which are maintained to provide information on individual service segments operated by the certificated route air carriers. A service segment is defined as a pair of points served or scheduled to be served by a single state of at least one flight within any given time period. Once the data has been processed, it is then possible to extract or retrieve data by flight number, origin airport, destination airport, aircraft type, and type of service for each carrier. Included in these retrievals are data on passengers and traffic enplaned and transported, the number of departures scheduled and performed, the available capacity of each aircraft by number and class of passengers and cargo payload, as well as the number of miles and time taken to complete each flight. Each retrieval will also include desired traffic data such as passenger load factors and average revenue loads.

Formal authorization from CAB is required for access to restricted data.

Civil Aeronautics Board No Date, 9 pp

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Civil Aeronautics Board, National Archives and Records Service, Washington, D.C., 20428

08 176909
LT HEATHROW LINK COMPLETE. LONDON TRANSPORT'S UNDERGROUND RAILWAY LINK TO HEATHROW AIRPORT COMPLETE
A brief description is given of the new section of underground linking Heathrow Airport to the existing Piccadilly line. Aspects covered include layout, construction details, interior design, timing of train services and communications, which include a closed circuit TV link to the line controller at Earls Court. Tourist facilities include a comprehensive information centre staffed by British Rail, London Transport and the London tourist board, a sterling exchange office and a computer-controlled journey-planner for routine route information.

Modern Railways Analytic Vol. 35 No. 353, Feb. 1978, pp 70-71, 1 Tab., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-231802)
ORDER FROM: ESL

08 180147
FACTORS INFLUENCING SCHEDULE RELIABILITY IN INTERNATIONAL OPERATIONS
Scheduling problems encountered by an international airline operating long-distance routes between the northern and southern hemispheres are discussed. Timetable setting, which depends on curfews in effect at the airports of arrival and departure, is considered; variations in flight time due

to more or less favorable wind components are also mentioned. Airport departure delays caused by aircraft defects, government authorities, passenger and baggage transport, ramp handling and crew relief problems also receive attention.

Yafes, RJ (Qantas Airways, Limited, Australia) *Aeronautical Journal* Vol. 82 Jan. 1978, pp 1-11

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-29213)
ORDER FROM: AIAA

A78-29213

08 180418

A QUEUEING MODEL OF AIRPORT PASSENGER DEPARTURES BY TAXI: COMPETITION WITH A PUBLIC TRANSPORTATION MODE

A Poisson queue with random clearing of all customers is formulated for the purpose of studying the interaction between taxicabs and buses at an airport. The analytical model is validated by comparison with a detailed simulation model calibrated from actual airport data. The operating characteristics of this transportation system are studied. The mean daily and mean peak period expected waiting times and the probabilities of modal switching as a function of the number of taxis in service and bus frequencies are exhibited. Taxis are discovered to be a highly effective transport mode, substituting at the rate of one daily cab to one additional daily bus trip for equal mean peak period passenger wait.

Curry, GL (Texas A&M University) *Transportation Research* Vol. 12 No. 2, Apr. 1978, pp 115-120, 9 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

09 149808
FINANCING FUTURE TRANSPORTATION NEEDS IN THE NEXT DECADE, 1978-1987; A PRIVATE SECTOR REPORT
This report of the American Transportation Advisory Council (ATAC) on the financing of future transportation needs is based on data from private sector organizations in the transportation industry. It concentrates on the areas of major Federal responsibilities and interest. Needs of the individual modes such as airports, highways, pipelines, public transit, railroads, and waterways are stated. Needs estimates include some private sector investment requirements, especially for railroads and pipelines. A strong effort was made to provide conservative and supportable funding needs figures. In total, it is indicated that Federal support should be increased from the $12.9 billion level in 1977 to a $22.3 billion level in the next decade-an increase of 73.5 percent. Descriptions are given of the following funding options: unified transportation funding, trust funds, user charges, energy tax, other tax sources.

American Transportation Advisory Council Feb. 1977, 87 pp, Tabs.

09 155693
OPTIMAL PRICING POLICIES FOR AIR TRANSPORT NETWORKS
This paper suggests how marginal cost pricing can be used to optimize the level of service provided by air transport. The analysis indicates (1) that active governmental intervention is generally necessary to achieve a social optimum: (2) that fixed prices, as implied either by regulation of IATA, are largely ineffective by themselves at maximizing either the public good or private gain to the airlines; (3) that the governmental intervention should involve either taxes or subsidies, depending on the kind of externalities that exist, and that these s' ould be applied differentially to the passengers and airlines; and (4) that it is optimal, for both the public and the airlines, to fly aircraft essentially full and that it would be desirable to institute a system of flexible prices for off-peak travel so that this could be achieved. /Author/

de Neufville, RL Mira, LJ *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 181-192, 5 Fig., 24 Ref.

ORDER FROM: ESL

09 163568
TRANSPORTATION FINANCIAL NEEDS DURING THE NEXT DECADE (1978-1987)
This report which focuses on the areas of major federal responsibilities and interest, includes individual modal reports for airports, highways, pipelines, public transit, railroads and waterways. The specific areas for which needs estimates have been made are outlined and the data sources are indicated. The needs estimates include some private sector investment requirements, particularly in the area of railroads and pipelines. The needs study also considered equipment requirements. The figures indicate that Federal support should be increased from the level of approximately $13 billion in Fiscal Year 1977 to an average level of $22 billion in the next decade. The total transportation needs figure, including all sources of funding, average to $64.79 billion per year during the next decade.

American Transportation Advisory Council May 1977, 38 pp, Tabs., Phots., Refs., 1 App.

09 168672
EVALUATION OF NASA-SPONSORED RESEARCH ON CAPITAL INVESTMENT DECISION MAKING IN THE CIVIL AVIATION INDUSTRY
Significant findings of three studies undertaken to provide the NASA Aircraft Energy Efficiency (ACEE) Office with information regarding how aircraft manufacturers and commercial airlines make investment decisions concerning the acquisition of new and derivative technology are analyzed and their general implications explored. Topics discussed include: the market for airline aircraft, factors affecting the corporate decision making process of air transport manufacturers, and flight equipment purchasing practices of representative air carriers.

Donovan, DJ
Michigan University, Ann Arbor NASA-CR-154620, Mar. 1977, 27 pp

Contract NASA ORDER W-14258

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-28101/2ST

09 170831
AIRLINE SUBSIDIES IN THE UNITED STATES
The author attempts to define the meaning of a subsidy in the context of American Airlines operations, and goes on to look at the various types presently operating. Two main types, air main subsidies and public service revenues are explained and their historical development outlined. A justification for the existence of subsidies is advanced, and future subsidy policy designed to lead away from continued public support, is suggested.

Scott, R Farris, M (Arizona University) *Transportation Journal* Vol. 13 No. 4, 1974, pp 25-33

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: ESL

09 170834
SUBSIDIES AND THE LOCAL SERVICE AIRLINES. THE US EXPERIENCE
Federal government subsidies to local service airlines in the United States are analysed, and it is concluded that the government is bearing over half the cost of providing a service over marginal routes, a cost which can only be justified on social grounds. The author suggests that the profitability of these routes can only be increased by increasing the frequency of service, but decreasing the size of aircraft used. Present operators are, for a number of reasons, unwilling to respond in this way. The author concludes that a system of sub-contracting should be instituted on these marginal routes in order to improve service and lower subsidies.

Eads, G (George Washington University) *Logistics and Transportation Review* Vol. 10 No. 1, 1974, pp 23-39, Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: British Columbia University, Canada, Vancouver V6T 1W5, British Columbia, Canada

09 170850
FINANCING LOCAL AUTHORITY AIRPORTS
The author shows how factors of profitability and local needs have to be taken into account when considering whether to develop or maintain a provincial airport, with particular reference to Manchester airport. The financial ability to develop or expand must be related to the availability of capital finance within the local authority and to the balance of aviation revenues and costs. The author argues that because of current financial stringency a national airports plan should be developed to enable local authorities to decide their aiport development programmes.

Bowers, J *Telescope* Vol. 27 No. 2, Nov. 1975, pp 41-45

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Chartered Inst of Public Finance & Accountancy, 1 Buckingham Place, London SW1E 6HS, England

09 173832
A LOOK AT LONG-TERM AIRPORT FINANCING
This article briefly describes the procedures involved when considering long-term airport financing. With most airports, the financial manager faces the option of financing his project through the sale of general obligation bonds, straight revenue bonds or lease rental bonds. Once having decided to finance the proposed project through borrowed capital, the next question may be whether to borrow by short-term notes or by issuing, long-term bonds. The airport seeking to enter the long-term bond market must utilize the services of an attorney, an airport consultant, auditors, and financial consultants in order for a successful bond sale at the lowest interest rates consistent with the market. As a result of federal legislation, each bidder and investor is committed to a more thorough review of each revenue bond issue prior to the sale. In addition to distribution of the official statement to potential investors prior to the sale, it should also be submitted to the major municipal rating agencies for a credit review. An important responsibility for the financial manager following the bond sale, is the aggressive and prudent investment of cash available in the various funds and accounts.

Fleischmann, FX (Wainwright and Ramsey Incorporated) *Airport Management Journal* Vol. 3 No. 1, Apr. 1978, pp 22-24

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

09 173834
FINANCING AIRLINE RE-EQUIPMENT TO 1987: WHERE IS THE MONEY TO COME FROM?
This article highlights the major points incorporated in an address on airline financing. It is noted that from the post-war period until the oil crisis of 1973/74, the airlines made record investments in new equipment. By the mid-1970's traffic growth had slumped causing a severe drop in earnings. The coming together of a short fall-off in traffic, serious over-capacity, rising operating costs and a heavy debt load resulted in a crisis situation. It is now apparent that a much larger proportion of future airline financing requirements will have to be raised externally. In general, the major source of finance for U.S. carriers has been commercial banks. These loans were unsecured, based on the credit-worthiness of the airline and the amount of government support it received. U.S. airlines were also able to borrow from insurance companies offering longer repayment periods. It is noted that airlines are now expected to improve the efficiency and productivity of their existing equipment and operations if they are to generate sufficient financial reserves to help finance the next round of acquisitions of more productive aircraft. A suggested remedy is for the financing agencies of the aircraft manufacturing countries to extend their terms from ten to fifteen years. Other techniques include long-term leasing, with the lessor having 20-30 percent equity in the leasing entity. It is ultimately vital to the well being of both the manufacturer and the purchaser that ways be found to permit the acquisition of airliners which can operate profitably.

Interavia Vol. 33 Jan. 1978, pp 42-43

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

09 173867
AIRPORT LANDING FEES AND CONGESTION. A SYSTEMS ANALYSIS
The effect on air traffic congestion of a landing fee structure, different from that currently used, is investigated. A two tier fee structure is proposed, and its relative effectiveness is compared to the existing landing fee structure using a computer simulation called AIRTAX. The peak fee charged is a function of the relative utilization time of the flight. The off-peak fee is a linear function of the load classification number. In this way large aircraft pay for the use of airport facilities at the same rate as small aircraft. The peak fee to be charged is developed in AIRTAX by a simulation of the auctioning of the available air movement slots. The number of air movement slots per hour is predetermined and the fee required to reduce demand to this level is calculated. The passengers who would have taken a flight that is cancelled are transferred to another flight to the same destination. A test run of AIRTAX on arrival and departure data for Toronto International Airport indicates that a rationalization of landing fees yields increased profits to air carriers through increased load factors and lower delay costs. Air passengers show a 40% reduction in delay costs, and total system effect is a net benefit. A sensitivity analysis of the key variables in the simulation shows that the model is tolerant of changes in the value of time, total revenue generated and minimum fees but is sensitive to extreme changes in carrier load factors and acceptance rates. /Author/

Paper presented at the Transportation Research Board Annual Meeting, Washington, D.C., 1976.

Rose, K (Queen's University, Canada) Hamilton, GB (Department of Transport, Canada)
Queen's University, Canada 1976, 53 pp

ACKNOWLEDGMENT: Queen's University, Canada

09 176614
RATIONAL AIRPORT RATE MAKING
The pricing policy that is being developed for Portland International Airport is examined as well as the methodology for determining the rates and the present factors that have permitted this effort. The objective is to identify different areas of the airport and their associated costs, both capital and operating. From that, rates can ideally be established and each area would be placed on a break-even basis. Four work areas were identified: their terminal complex, the airfield, the airside development area, and the groundside development area. The base of the data system for operations is derived from a series of monthly computer gains or loss statements referred to as management reports. These reports give a monthly summary of revenues and expenses. The reports further divide the airport into 52 geographic locations and 11 functional locations. The bond ordinance and the agreement with the air carriers provide the mechanics for generating the capital funds necessary for future airport development. Having identified annual operating and capital costs, and recognized the revneues anticipated from each and except the landing fees and terminal rents, the next step required is to add enough revenues into the terminal complex and airfield to bring total revenues up to the sum of operating and capital expenses. These added revenues will give the break-even rental rate and landing fee. The whole exercise is meant to establish a "rational: methodology for ratemaking policy whereby fees are not subject to negotiation but are the direct result of the budget process. It also allows all tenants to be treated on the same basis while the airport generates the required revenues. The emphasis is on cooperative rather than adversary relations, and allows all parties to concentrate on things that are more important than rate negotiations.

Sartin, J *Airport Management Journal* Vol. 2 No. 3, Oct. 1977, pp 21-24

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

09 176616
COLLECTING AND CONTROLLING AIRPORT VEHICLE PARKING REVENUE
Revenue generated by fees charged for parking private vehicles at airport parking lots constitute a sizeable portion of the total revenues collected by the airport. The control of vehicle parking and maximizing the amount paid for parking should receive greater attention by airport management. The usual operations of an airport vehicle parking complex is described and two daily actions are noted as being necessary to make this system more controllable: Vehicle count and inventory. A proposed method of control is described that would eliminate the nonpayment of parking fees and cashier losses. This method is a completely automated system with a computer bank and calculating cash registers. It consists of four main items. A scanning device that reads the license numbers and imprints it on the ticket, a computer that stores the information as well as the time and date of the entrance, a cash register that computes the fee in conjunction with the computer, and a master clock that would keep all the clocks automatically synchronized throughout the parking complex. One of the major obstacles that must be overcome before such a system is achieved is a standard location for the license to be displayed on a vehicle, both front and rear. It is estimated that this system can be installed for about $10,000 per cashier booth if a computer or computer storage capacity is available.

O'Brien, FI *Airport Management Journal* Vol. 2 No. 3, July 1977, pp 8-12

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

09 176645
EVALUATION TECHNIQUE FOR DETERMINING THE COST EFFECTIVENESS OF CONDITION MONITORING SYSTEMS
The technique uses historical data combined with catalog cost estimating to estimate both the life cycle cost of the condition monitoring system and the potential cost savings offered by the system for commercial engines. The results are obtained in a form that can be easily converted to any of the primary cost-effectiveness parameters in current use by industry. Key to the technique is the definition of a series of condition monitoring system concepts of increasing complexity for analysis, with each increase representing a logical step with respect to cost-effectiveness. This feature permits the results of the cost-effectiveness analysis to be applied directly to the design definition process without iteration or further cost analysis.

Prepared for ASME Meeting, April 9-13, 1978.

George, PT (United Technologies Corporation) Parker, AT
American Society of Mechanical Engineers Preprint ASME 78-GT-166, 1978, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

09 176742
THE FUTURE STRUCTURE OF THE GERMAN AEROSPACE INDUSTRY
The Federal German Cabinet has linked its decision to come to the financial aid of VFW-Fokker with a demand that VFW-Fokker and MBB sharehold-

ers keep discussions open on a merger. It has been the Federal Government's view that state ownership or control is not the best way to re-adapt the structure of the German aerospace industry to the requirements of extremely complex future projects and secure a firm base for a competitive posture. The Government, it is noted, has clearly declared itself in favor of a merger between MBB and VFW-Fokker, with the aim of achieving a competitive aerospace industry organization with a regionally balanced operating structure, so that jobs in the German aerospace industry will be insured for a long period of time. The merger, however, is only one element in the reorganized aerospace industry of the future. The developed and broader European basis in order to attain a durable position on the world market.

Gruner, M *Interavia* Vol. 33 Apr. 1978, p 261

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

09 176743
MAJOR DECISIONS AHEAD FOR GERMAN AEROSPACE INDUSTRY

A broad overview of the major decisions and developments affecting the German aerospace industry are presented. Production and development status of the Federal Association of Human Aerospace Industries (BDLI) are described and it is noted that the shortage of development work is growing more acute. VFW-Fokker and MBB are presently jockeying for position in anticipation of the expected merger. VFM-Fokker's reorganization efforts have managed to stave off bankruptcy, and MBB, despite considerable financial burdens, has maintained a good balance sheet. The Dornier Group on the other hand, has maintained a financially stable position primarily because of it's emphasis on diversification, specialization, and capacity restriction. The aircraft engine sector presently constitutes an integral part of German aerospace industry.

Interavia Vol. 33 Apr. 1978, pp 297-302

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

09 178458
FINANCIAL ISSUES AND OUTLOOK. THE U. S. VIEWPOINT

The airline industry is on the move in providing adequate service to meet the growth in public demand. The industry, however, faces a very difficult problem in obtaining adequate financing to meet the need for new aircraft and ground support equipment in the years ahead. Earnings are still significantly below the level needed to obtain funds to meet future capital requirements. Even with the upturn in earnings experienced in 1976 and those anticipated for 1977, the industry will be only about half way to the annual level needed to adequately finance the $65 billion worth the equipment needed for replacement and traffic growth during the 1976-1989 period. The author makes some observations on the short range outlook of the industry, the comparative status of the airline with other U. S. industries, and the financial issues facing the U. S. airlines.

ASCE, Air Transportation Division Special Conference Inst Air Transp Conference Proceedings, Washington, D.C., April 4-6, 1977.

James, GW (Air Transportation Association of America)
American Society of Civil Engineers Proceeding 1977, pp 29-50

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 092193
IMPACTS OF POTENTIAL 1980'S AVIATION TECHNOLOGY ON THE CAPACITY OF AN EXISTING AIRPORT
This study was conducted to determine the impacts which potential 1980's advances in aviation technology might have on the capacity and surrounding environment of a high-density air carrier airport. New York's La Guardia Airport was chosen to illustrate these impacts. Actual 1972 airport operations, and anticipated 1985 airport operations are examined. Four advanced technology development alternatives were identified for the mid to late 1980's time frame. A detailed airport configuration plan was derived for the development alternatives which had the highest potential passenger capacity.

See also Volume 1 dated Mar 75, AD-A013 432.

Drago, VJ
Battelle Columbus Laboratories, Transportation Systems Center Final Rpt. TSC-FAA-AVP-75-1-V2, Mar. 1973, 238 pp

Contract DOT-TSC-636

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A013920/4ST

10 154979
FORECASTING MODELS FOR AIR FREIGHT DEMAND AND PROJECTION OF CARGO ACTIVITY AT U. S. AIR HUBS
This report provides a basic forecast of U.S. domestic and U.S. international air freight demand at the twenty-five large U.S. hubs for the time period 1977 to 1987 which results from exercising the models described in this report with a specific set of input variable projections. This report also documents an econometric model approach to long-term, national air freight demand forecasting. This approach provides forecasts founded on the premise that no dramatic technological or socio/political changes will occur in the forecast time period. (Author)

Maio, DJ Wang, GH Meltzer, N
Transportation Systems Center FAA-AVP-77-2, Jan. 1977, 164 pp

ACKNOWLEDGMENT: NTIS
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AD-A037838/0ST

10 155026
DOMESTIC AND WORLD TRENDS (1980-2000) AFFECTING THE FUTURE OF AVIATION
Variables affecting aviation in the United States during the last fifth of the twentieth century are studied. Estimates of relevant future developments are presented and their probable impact on the aviation industry in this country are identified. A series of key trends relating to economic, social, political, technological, ecological and environmental developments are identified and discussed with relation to their possible effects on aviation. From this analysis, a series of scenarios are developed representing an array of possibilities ranging from severe economic depression and high international tension on the one hand, to a world of detente which enjoys an unprecedented economic growth rate and relaxation of tensions on the other. A surprise free scenario is presented which represents the best judgment of the manner in which events will most probably develop and the effect on the aviation industry such developments will likely produce.

Friedman, N Overholt, W Thomas, J Wiener, AJ
Hudson Institute Incorporated Final Rpt. NASA-CR-144838, Aug. 1975, 104 pp

Contract NAS5-20852

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-14981/3ST

10 157548
TRAFFIC FORECASTS AS A BASIS FOR INTEGRATED TRANSPORT PLANNING [Verkehrsprognosen als Grundlagen einer integrierten Verkehrsplanung]
The word "integrated" is highly fashionable at the moment and it means that the planning process is for an overall transport system including the operators (road haulers, railways, waterways and airlines) and the public authorities that up until now dealt with their own forecasts for their own areas of activity on a regional, national and community basis. [German]

Macke, PA *Verkehrsannalen* Vol. 23 No. 6, 1976, pp 526-534, 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Verkehrsannalen, Gauermanngasse 4, Vienna 1010, Austria

10 158550
FORECASTS OF AIRCRAFT ACTIVITY BY ALTITUDE, WORLD REGION, AND AIRCRAFT TYPE
The level of international air traffic on a world-wide basis is analyzed for the base year of 1975 and forecast for the years of 1980, 1985, and 1990. An econometric model is used to forecast flight activity using regional economic and population data and data on fuel prices and other aircraft operating costs. Other models transform these forecasts into estimates of aircraft flight hours at various altitudes over areas of the globe. A special model was devised which probabilistically assigns flight-hour activity to specific aircraft types in future years as fleet composition changes. The evidence illustrates the prominence of U.S., European, and U.S.-European traffic in total activity. It also indicated the gradual transition to wide-body aircraft and the gradual phasing out of four-engine, narrow-body transports. (Author)

See also Rept. no. FAA-RD-76-15 dated Apr 76, AD-A027 880.

Pozdena, RJ
Stanford Research Institute Final Rpt. FAA-AVP-76-18, Nov. 1976, 130 pp

Contract DOT-FA75WA-3574

ACKNOWLEDGMENT: NTIS
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AD-A039016/1ST

10 159096
GENERAL AVIATION DYNAMICS, AN EXTENSION OF THE COST IMPACT STUDY TO INCLUDE DYNAMIC INTERACTIONS IN THE FORECASTING OF GENERAL AVIATION ACTIVITY, VOLUME I, EXECUTIVE SUMMARY
This report, in four volumes, presents the General Aviation Dynamics (GAD) model which was developed for the Federal Aviation Administration by Battelle's Columbus Laboratories. The GAD model is a dynamic simulation model of the general aviation (GA) system and can be used to forecast GA activity, evaluate alternative policy actions, or perform sensitivity analyses. It has three major sectors, depicting the most important state variables in the model: pilot supply, aircraft utilization, and aircraft demand. Essentially, the GAD model consists of a set of nonlinear, simultaneous, first order difference equations which explicitly describe the decision policies followed by users of general aviation. The model is designed to be implemented through an interactive computer dialogue feature that guides the analyst through a series of procedures and analytical options.

See also Volume 2, AD-A039 839.

Duffy, MA Eiden, GL Hamilton, CW Drago, VJ
Battelle Columbus Laboratories Final Rpt. FAA-AVP-77-20-Vol 1, Dec. 1976, 24 pp

Contract DOT-FA74WA-3485

ACKNOWLEDGMENT: NTIS
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AD-A039807/3ST

10 159097
GENERAL AVIATION DYNAMICS, AN EXTENSION OF THE COST IMPACT STUDY TO INCLUDE DYNAMIC INTERACTIONS IN THE FORECASTING OF GENERAL AVIATION ACTIVITY, VOLUME IV, DATA BASE
This report, in four volumes, presents the General Aviation Dynamics (GAD) model which was developed for the Federal Aviation Administration by Battelle's Columbus Laboratories. The GAD model is a dynamic simulation model of the general aviation (GA) system and can be used to forecast GA activity, evaluate alternative policy actions, or perform sensitivity analyses. It has three major sectors, depicting the most important state variables in the model: pilot supply, aircraft utilization, and aircraft demand. Essentially, the GAD model consists of a set of nonlinear, simultaneous, first order difference equations which explicitly describe the decision policies followed by users of general aviation. The model is designed to be implemented through an interactive computer dialogue feature that guides the analyst through a series of procedures and analytical options. The volumes included in this report are: Volume I- Executive summary; Volume II-Research Methodology; Volume III-Planning Guide; and Volume IV-Data Base.

See also Volume 1, AD-A039 807.

Duffy, MA Eiden, GL Hamilton, CW Drago, VJ
Battelle Columbus Laboratories Final Rpt. FAA-AVP-77-20-Vol 4, Dec. 1976, 89 pp

Contract DOT-FA74WA-3485

ACKNOWLEDGMENT: NTIS
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AD-A039808/1ST

10 159101
GENERAL AVIATION DYNAMICS. AN EXTENSION OF THE COST IMPACT STUDY TO INCLUDE DYNAMIC INTERACTIONS IN THE FORECASTING OF GENERAL AVIATION ACTIVITY. VOLUME II. RESEARCH METHODOLOGY [Final rept. 17 Oct 75-31 Dec 76]

This report is the result of a series of research programs dealing with the cost impact effects on general aviation conducted by Battelle Memorial Institute-Columbus Laboratories. Past studies were aimed at developing a consistent data base and methodology for determining the influence of cost changes on both numbers of active aircraft and annual hours flown. During these studies, it became apparent that the complex nature of the general aviation system was not being adequately represented with a set of independent, log-linear regression equations. A method is needed which, (1) focuses on general aviation activity at the lowest possible level; that is, by individual user category/aircraft type subsegments; (2) recognizes the important causal interactions between pilots, aircraft, and annual hours flown; (3) Has the ability to assess various policy alternatives quickly; and (4) Can be easily modified as future forecasting requirements are identified. This report presents the results of a model development effort designed to satisfy the above objectives. Throughout the report, discussion of the model is couched in the terminology of system dynamics.

See also Volume 3, AD-A039 911.

Duffy, MA Eiden, GL Hamilton, CW Drago, VJ
Battelle Columbus Laboratories Final Rpt. FAA-AVP-77-20-Vol 2, Dec. 1976, 183 pp

Contract DOT-FA74WA-3485

ACKNOWLEDGMENT: NTIS
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AD-A039839/6ST

10 159107
GENERAL AVIATION DYNAMICS. AN EXTENSION OF THE COST IMPACT STUDY TO INCLUDE DYNAMIC INTERACTIONS IN THE FORECASTING OF GENERAL AVIATION ACTIVITY. VOLUME III. PLANNING GUIDE

The General Aviation Dynamics model is implemented in NUCLEUS, a computer software system developed at Battelle. It can be accessed almost any time and from anywhere in the U. S., provided a telephone, an on-line terminal, and an authorized user name and password are available. This Volume will detail the procedures of logging into and out of the Battelle Computer System, initiating interaction with NUCLEUS, and using the GAD model for forecasting and sensitivity analyses. Required inputs, possible outputs and an illustrative example are presented. (Author)

See also Volume 4, AD-A039 808.

Duffy, MA Eiden, GL Hamilton, CW Drago, VJ
Battelle Columbus Laboratories Final Rpt. FAA-AVP-77-20-Vol 3, Dec. 1976, 41 pp

Contract DOT-FA74WA-3485

ACKNOWLEDGMENT: NTIS
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AD-A039911/3ST

10 159125
AVIATION FORECASTS FY 1977-1988, SUMMARY AND BRIEFING CONFERENCE

The second annual Federal Aviation Administration Forecast Conference was held on December 2, 1976, at Reston, Virginia. This report of the proceedings includes all the formal presentations and some representative questions and answers. This Conference, like the previous one, was held for the primary purpose of (1) reemphasizing the importance of accurate data and aviation activity forecasts for Federal Aviation Administration (FAA) planning and budgetary purposes, and (2) stimulating the interchange of ideas between FAA and the aviation community. Some of the topics discussed included: growth anticipation in the general aviation and air taxi industries, aircraft financing difficulties of the airlines, long-term aviation developments. Highlights of the aviation Forecasts for Fiscal Years 1977-1988, forecasting techniques and industry analyses of completed research were also discussed. This publication includes Conference papers as well as questions and answers raised during the discussion period. (Author)

Report on the annual Federal Aviation Administration Forecast Conference (2nd), 2 Dec 76, Reston, Va.

Federal Aviation Administration FAA-AVP-77-16, Dec. 1976, 285 pp

ACKNOWLEDGMENT: NTIS
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AD-A040065/5ST

10 164934
TECHNOLOGY OUTLOOK FOR AVIATION

In the past thirty years, the growth of aviation has resulted in substantial benefits being brought to industrial nations of the world and especially to the United States. As a leader in aviation development, the United States has benefited from its research and development investments in terms of greater productivity, improved air transportation, as well as favorable contributions to its balance of trade. In the future, it is expected that air transportation will be important in shaping urban development and stimulating national and international commerce. In addition, the possibility exists that new uses for aircraft may add additional impetus to aviation development.

Prepared for SAE Meeting 29 Nov.-2 Dec. 1976.

Roberts, L (Ames Research Center)
Society of Automotive Engineers Preprint SAE 760928, 1976, 9 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 166189
CIVIL AIRCRAFT OF THE FUTURE AND NEW TECHNOLOGICAL DEVELOPMENTS

Various developments in engine design, aerodynamics, structural design, and systems design are discussed. With application of advanced technology, it will be possible to develop long-range passenger airliners which will be 40% more economical than the best aircraft now in operation.

Tran-Transl. Into English from Air et Cosmos (France), No. 642, 23 Oct. 1976 p 15, 48.

Morisset, J
Transemantics Incorporated NASA-TT-F-17535, Apr. 1977, 7 pp

Contract NASW-2792

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-21082/1ST

10 166510
TRANSPORTATION IN AMERICA'S FUTURE: POTENTIALS FOR THE NEXT HALF CENTURY. PART 1. SOCIETAL CONTEXT

The report describes four potential socioeconomic futures for the United States and their implications for transportation through 2025. The futures--designated Success, Foul Weather, Disciplined Society, and Transformation--vary particularly in economic performance, climate, institutional structure, and personal values. For each future, Part 1 provides a detailed narrative account or scenario, accompanied by separate analyses of the energy, demographic, economic, and urban implications of each scenario. Part 2 provides demand forecasts for most modes; technology forecasts for twelve transportation modes and seven specific systems or technologies; and analyses of six critical transportation problems.

See also Part 2, PB-270 468.

Curry, D Carlson, R Henderson, C Mandel, T Mitchell, A
Stanford Research Institute, Department of Transportation. (SRI-URU-5040) Final Rpt. DOT/TPI/20-77/21-1, June 1977, 131 pp

Contract DOT-OS-60160

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-270467/4ST

10 166511
TRANSPORTATION IN AMERICA'S FUTURE: POTENTIALS FOR THE NEXT HALF CENTURY. PART 2. TRANSPORTATION FORECASTS
Contents: Transportation demand and energy estimates; Transportation trends and issues under three futures for 1995; Prospects for new and improved transportation systems by 2025 (Air, Avionics, Shipping, Pipelines and tunnels, Railroads, Intercity buses, Highways and streets, Trucking, Automobiles, Urban transit and rail, Paratransit, Pedestrian aids and bikeways, Elderly and handicapped services); Electric and hybrid automobiles; Innovative urban systems; Automated highway system; A generic approach to advanced freight systems; Tracked levitated vehicles, improved passenger trains and buses; The successful SST; Some transportation implications of future telecommunications technology; Transportation problems and opportunities.
See also Part 1, PB-270467.

Curry, D Carlson, R Henderson, C Mandel, T Mitchell, A
Stanford Research Institute, Department of Transportation, (SRI-URU-5040) Final Rpt. DOT/TPI/20-77/21-2, June 1977, 343 pp

Contract DOT-OS-60160

ACKNOWLEDGMENT: NTIS
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PB-270468/2ST

10 168576
FORECAST OF COMMUTER AIRLINES ACTIVITY
This report assesses the potential of the commuter airline industry including the identification of those short-haul low-density points that are likely prospects for future commuter service. The first section provides a national forecast of commuter airline enplanements, revenue passenger miles, number of aircraft operations and composition of fleet for 1975 to 1988. The second part of the report describes a model developed to disaggregate the activity forecast to individual points with existing service or anticipated future service, and provides forecasts for those points. (Author)
Aviation activity forecast 1977-1988.

Deosaran, G Sweezy, H Van Duzee, R
Federal Aviation Administration FAA-AVP-77-28, July 1977, 141 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A044804/3ST

10 169105
TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME III. CONTRIBUTIONS OF TELECOMMUNICATIONS TO IMPROVED TRANSPORTATION SYSTEM EFFICIENCY
Telecommunications expenses constitute a small fraction (about 2%) of the monies paid out by the transportation industry; however, the role of telecommunications is vital in providing for safe and efficient operation. This report describes the way that telecommunications are used in the transportation industry by sectors, including pipelines, railroads, motor trucking, aviation, and urban transportation. Proposals for increased use of telecommunications are also examined and evaluated. The conclusions of the report are that there are several significant new applications for telecommunications to support transportation activities, but that the importance of telecommunications in terms of fraction of transportation expenses will not dramatically increase. Economically justified proposals for new applications will require an investment of about $3 billion over the next 20 years. This is less than the expected investment in current technology over the same period. The justifications for increased use of telecommunications are reduction in personnel needed to operate systems, by use of communications in automation; reductions in the need for equipment, primarily vehicles, through more efficient management of assets; and substitution of telecommunications investment for investment in construction to increase capacity of highways, railways, and airways. The authors find that such a substitution will usually result in a savings of scarce material resources without the environmental and social distribution that would result from the construction.
See also PB-272693-SET/ST

Moon, AE Johnson, JM Meko, EP, II Proctor, HS Feinstein, CD
Stanford Research Institute, National Science Foundation, (SRI-4293) Final Rpt. NSF/RA-770159, May 1977, 127 pp

Contract NSF-C1025
ACKNOWLEDGMENT: NTIS
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PB-272696/6ST

10 169106
TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME II. DETAILED IMPACT ANALYSES
This "technology assessment" identified and analyzed the social, economic and environmental consequences of possible future changes in the relationships between telecommunications and transportation. The report includes 30 in-depth impact analyses and a 1090-entry bibliography.
See also PB-272693-SET/ST

Harkness, RC
Stanford Research Institute, National Science Foundation, (SRI-4293) Final Rpt. NSF/RA-770158, May 1977, 1058 pp

Contract NSF-C1025

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-272695/8ST

10 169107
TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS. VOLUME I. INTRODUCTION, SCENARIO DEVELOPMENT, AND POLICY ANALYSIS
This technology assessment identified and analyzed the social, economic and environmental consequences of possible future changes in the relationships between telecommunications and transportation. Scenarios were used to describe these changes. Effort was focused on three types of scenarios: (1) audio or audio-video teleconferencing as a substitute for face-to-face meetings and business travel by air or auto, (2) increased decentralization of office employment from city centers to suburban locations resulting from more teleconferencing and thus less need for physical agglomeration, and (3) office employees using terminals to work at home or in neighborhood office centers near home. The scenarios were found to have significant implications for energy conservation, urban development, commuting, mass transit, job accessibility for persons unable to commute, communications within organizations, residential locational freedom, the telecommunications industry, the airline industry, and other areas. This concept of moving information to people is offered for widespread consideration by planners, policy-makers, industry, and the public.
See also PB-272693-SET/ST

Harkness, RC
Stanford Research Institute, National Science Foundation, (SRI-4293) Final Rpt. NSF/RA-770157, May 1977, 195 pp

Contract NSF-C1025

ACKNOWLEDGMENT: NTIS
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PB-272694/1ST

10 169108
TECHNOLOGY ASSESSMENT OF TELECOMMUNICATIONS/TRANSPORTATION INTERACTIONS
No abstract available.
Set includes PB-272694 thru PB-272696. Volume I-III

Stanford Research Institute, National Science Foundation 3 volumes, May 1977, 1380 pp

ACKNOWLEDGMENT: NTIS
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PB-272693-SET/ST

10 169418
THE IMPACT OF MICROCOMPUTERS ON AVIATION: A TECHNOLOGY FORECASTING AND ASSESSMENT STUDY. VOLUME I. UNCONSTRAINED FORECASTS OF MICROCOMPUTER TECHNOLOGY

In recognition of the major impact which microcomputers may have on society in general, and aviation in particular, the Federal Aviation Administration, Office of Aviation Policy, Policy Development Division, System Concepts Branch, has funded this study consistent with the goals of its Technology Assessment and Forecasting Program. The study has as its main objective the assessment of the impact of microcomputers on the National Aviation System (NAS). The time horizon of the impact assessment is 1976 to 2000 A.D. The impact will be assessed with respect to the important goals of the NAS, specifically, those referred to as the 'S3E' goals (Safety, Energy, Environment, Economics). Another objective of the study is to identify the policy implications accompanying the impacts. (Author)

See also Volume 2, AD-A046 218.

Adler, A Ayers, FT Chen, K Lyjak, R Wise, KD
Onyx Corporation Final Rpt. OTSD-77-609-9-1, Sept. 1977, 317 pp

Contract DOT-FA76WAI-609

ACKNOWLEDGMENT: NTIS
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AD-A046217/6ST

10 169419
THE IMPACT OF MICROCOMPUTERS ON AVIATION: A TECHNOLOGY FORECASTING AND ASSESSMENT STUDY. VOLUME II. CONSTRAINED FORECASTS AND ASSESSMENT OF MICROCOMPUTER TECHNOLOGY

The study of the impact of microcomputers on aviation consists of two parts. The first part, technological forecasting of microcomputers, with specific reference to aviation applications, has been reported in Volume I. This volume (Volume II) presents the results of technology assessment of microcomputers, with special emphasis on the impacts of microcomputers, with special emphasis on the impacts of microcomputers on the National Aviation System (NAS), and their policy implications. (Author)

See also Volume 1, AD-A046 217.

Ayers, FT Chen, K Jarboe, K Wise, KD Yokely, R
Onyx Corporation Final Rpt. OTSD-77-609-9-2, Sept. 1977, 197 pp

Contract DOT-FA76WAI-609

ACKNOWLEDGMENT: NTIS
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AD-A046218/4ST

10 169450
TERMINAL AREA FORECAST 1978-1988

This report contains forecasts for air carrier and air taxi enplanements, air carrier and air taxi aircraft operations, itinerant, total and instrument aircraft operations, and instrument approaches at 894 airports throughout the United States. The airports in this publication include all those with Federal Aviation Administration air traffic control towers and those with air carrier service. The report is intended as an aid for anticipating future manpower and equipment needs at terminal areas. (Author)

See also report dated Jan 76, AD-A026 753. Availability: Microfiche copies only.

Federal Aviation Administration FAA-AVP-77-17, Jan. 1977, 353 pp

ACKNOWLEDGMENT: NTIS
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AD-A046543/5ST

10 169465
ALTERNATIVE FUTURE SCENARIOS FOR THE NATIONAL AVIATION SYSTEM. VOLUME 2. SCENARIO DESCRIPTIONS AND GRAPHICS

This study updated and expanded the five socioeconomic scenarios prepared for the FAA in the prior study similarly titled. These scenarios were revised to reflect changes in conditions since the original study and to incorporate new material that may better aid the FAA in policy analysis. Scenario sections on economics were greatly augmented to give substantive descriptions of the economic and financial processes, and a new sector on international conditions was added to each scenario. This volume contains the five scenario narratives as well as the projections for each of 46 variables which were selected to give quantification to the scenarios. Though the revised scenarios do not discuss the future NAS, Federal expenditures for non-defense aeronautical research and development were projected and the results are given in a separate section following the scenario narratives. This volume also contains a discussion of the major events which were found to influence scenario development. (Author)

See also Volume 3, AD-A046 744.

Fein, E Donahue, C Oppenheimer, M Goodrich, D Becker, H
Futures Group Final Rpt. 276-72-05/02, Feb. 1977, 296 pp

Contract DOT-FA76WA-3855

ACKNOWLEDGMENT: NTIS
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AD-A046743/1ST

10 169466
ALTERNATIVE FUTURE SCENARIOS FOR THE NATIONAL AVIATION SYSTEM. VOLUME 3. METHODS AND DATA FOR PROJECTING THE VARIABLES

Contents: Preface; Introduction, The TIA Procedure; Data Used in Making Projections.

See also Volume 4, AD-A046 745.

Fein, E Donahue, C Oppenheimer, M Goodrich, D Becker, H
Futures Group Final Rpt. 276-72-05/03, Feb. 1977, 292 pp

Contract DOT-FA76WA-3855

ACKNOWLEDGMENT: NTIS
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AD-A046744/9ST

10 169467
ALTERNATIVE FUTURE SCENARIOS FOR THE NATIONAL AVIATION SYSTEM. VOLUME 4. SUPPORTING DOCUMENTATION

Contents: Preface; Master Event List and Event Probabilities; Event-Variable Matrix; References for Key and Nas Events; Cross-Impact Analysis--Introduction--Methodology, Insights Obtained from the Cross-Impact Analysis; Comparative List of Variables Projected in the Revised and Original Study.

See also Volume 2, AD-A046 743 and Volume 3, AD-A046 744.

Fein, E Donahue, C Oppenheimer, M Goodrich, D Becker, H
Futures Group Final Rpt. 276-72-05/04, Feb. 1977, 61 pp

Contract DOT-FA76WA-3855

ACKNOWLEDGMENT: NTIS
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AD-A046745/6ST

10 170830
BRITISH AIRWAYS IN THE EIGHTIES

Outlines problems facing civil aviation industry and suggests solutions in rationalisation of carrying capacity. Reviews significant changes over last ten years, estimates British Airways contribution to national economy and makes a five year forecast. Describes present administrative structure of British Airways and assesses its industrial relations policies. Future capacity, types of aircraft and types of service offered are considered together with future possibilities of charter operations and hotel ownership. Suggests international governmental co-operation to find alternative fuel sources.

Nicolson, D (British Airways Board) *Chartered Institute of Transport Journal* Vol. 36 No. 4, May 1974, pp 81-89

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

10 170836
GENERATION OF 1995 INTRA-URBAN PERSON TRAVEL DEMAND FOR AIR CARRIER AIRPORTS

A brief outline of a method for the long term estimation of the total number of ground journeys generated by a major airport is presented. Ground trips made by airline passengers and by associated staff necessary to service the airport are both included. The method is applied in the article to forecasts for the years 1985 and 1995 for two airports in the Chicago area--Midway

and O'Hare. Such a method can be used in planning future highway and mass transit provision for airports as part of a total transportation system for an urban area.

Halagera, R Newmyer, D Seibert, C *CATS Research News* Vol. 16 No. 2, Oct. 1974, pp 1-6, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Chicago Area Transportation Study, 300 West Adams Street, Chicago, Illinois, 60606

10 170862
THE PREDICTION OF AIR TRAVEL AND AIRCRAFT TECHNOLOGY TO THE YEAR 2000 USING THE DELPHI METHOD
A delphi forecast for air traffic and technology during the 1990 to 2000 decade was made as part of the U.S. Department of Transportation Climatic Impact Assessment study. The planning of the delphi survey and the selection of participants is described. The methods for carrying out the analyses are described including the use of computers. The criterion for evaluating the degree of consensus and the need for additional iterations is outlined. Finally the results of the survey are presented. The general conclusion is that air traffic will grow at slower rates than it has in the past and no major new developments in aircraft technology are foreseen. Supersonic flight is predicted to grow but at a slow rate.

English, J Kernan, G *Transportation Research* Vol. 10 No. 1, Feb. 1976, pp 1-8

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: ESL

10 170866
FORECASTS OF PASSENGER TRAFFIC ON OSLO AIRPORTS, 1975-2000 [Framskriving av Oslo-omraadets flytrafikk, 1975-2000]
Forecasts of the passenger traffic on Oslo airports 1975-2000 are carried out under alternative premises of future income and competition between car, aircraft and railways. With strong economic growth and favourable change in air travel fares the number of passengers in 2000 is calculated to 16 millions. [Norwegian]

Kristiansen, K Storoey, I
Transportoekonomisk Institutt Apr. 1976, 83 pp, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

10 172452
STUDY ON AIR TRANSPORT IN THE PAST, THE PRESENT AND THE FUTURE [Etude sur le transport aerien: le passe, le present et l'avenir]
Despite the worldwide financial crisis of the past ten years, the air transport industry has achieved relatively good results. According to the forecasts of the ICAO, an average annual growth rate of 9% is expected for the next ten years.

ICAO Bulletin Vol. 32 No. 10, Oct. 1977, pp 18-25, 6 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

10 172733
METHODS OF TECHNOLOGICAL FORECASTING
The report contains six chapters providing a summary of technology forecasting methodology. The following topics are covered: basic modes of apprehending the future; future research and technological forecasting; projective, prospective, and decisional research; and selection, procedure, and quality criteria.

Hetman, F
Advisory Group for Aerospace Res & Dev-NATO No. 655, 1977, 42 pp, 72 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 172739
ROLE OF ADVANCING TECHNOLOGY IN THE FUTURE OF AIR TRANSPORT
Future developments in passenger aircraft design and technology are predicted, including an increase in aircraft capacity to 800 seats by the year 2000 AD, significant developments in both conventional and novel materials, the possibility of achieving nonturbulent (laminar) air flow over wings, the use of geared fanjet engines and the development of so-called propfans, and increased use of active control technology (the use of aerodynamic control surfaces on wings and tail). Also, improvements in passenger movement at airport terminals are discussed.

Wilkinson, KG (British Airways) *Aeronautical Journal* Vol. 81 No. 797, May 1977, pp 185-192

ACKNOWLEDGMENT: EI
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10 172752
DIRECTIONS IN CIVIL AVIATION 1980-2000
This paper attempts to summarize the future directions and opportunities in aeronautics, and to characterize the research and technology that should be conducted in the next decade in order to permit the timely development of civil aviation for the remainder of the Twentieth Century.
IEEE Paper 32 from IEEE Electron and Aerospace System Conv (EASCON '76), Washington, D.C., September 26-29, 1976.

Roberts, L (Ames Research Center)
Institute of Electrical and Electronics Engineers Proceeding 76CH1154-4 EASCON, 1976, 5 pp

ACKNOWLEDGMENT: EI
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10 172758
FUTURE OF SHORT-HAUL AIR TRANSPORT WITHIN WESTERN-EUROPE, WITH EMPHASIS ON THE ROLE OF V/STOL-AIRCRAFT
An outline is given of the future of short-haul transport in Western Europe, mainly based on a study of the Netherlands V/STOL-Working Group. The problems of the existing system using aircraft with conventional take-off and landing techniques (CTOL) to cope with the growth in passenger demand are considered. It is pointed out that the introduction of a new category of aircraft, using improved take-off and landing techniques (RTOL or STOL) can relieve these problems.

Wittenberg, H (Delft University of Technology, Netherlands) *Vertica* Vol. 1 No. 2, 1976, pp 165-173, 15 Ref.

ACKNOWLEDGMENT: EI
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10 172760
SCENARIOS OF AIR TRANSPORT DEVELOPMENT TO 1990 BY SMIC 74-- A NEW CROSS-IMPACT METHOD
The purpose of this paper is to describe the results of the application of the SMIC 74 method to a study of air transport development in the Paris area to 1990. SMIC 74 is a new cross-impact method that provides three kinds of results: (a) Consistent information on the events that may occur and influence the evolution of air transport: (b) cardinal ranking of the possible air transport development scenarios: and (c) sensitivity analysis. This method helps the decision-maker to choose between alternative strategies.

Godet, M *Technological Forecasting and Social Change* Vol. 9 No. 3, 1976, pp 279-288, 7 Ref.

ACKNOWLEDGMENT: EI
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10 172794
DIRECTIONS IN CIVIL AVIATION 1980-2000
An attempt is made to summarize the future directions and opportunities in aeronautics, and to characterize the research and technology that should be conducted in the next decade in order to permit the timely development of civil aviation for the remainder of the twentieth century.

Roberts, L (Ames Research Center) *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 7-14

ACKNOWLEDGMENT: EI
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10 172803
HYPERSONIC TRANSPORT TECHNOLOGY
The possibility of developing a hypersonic commercial transport (HST) for the early 21st century is explored in terms of potential performance

characteristics and recent advances in propulsion and structures technology. Range-gross weight characteristics indicate that a 200 passenger, Mach 6 aircraft with a range of 9200 km (500 n. mi.) have a gross take-off weight not too different from that of current wide-body subsonic transports. The low cruise sonic boom overpressures generated by the HST opens the possibility of supersonic overland flight. Recent advances in hypersonic propulsion systems and long-lived hypersonic aircraft structure are also discussed. The airframe-integrated scramjet and the actively-cooled airframe structure are identified as the most promising candidates for the HST and current approaches are described in some detail.

Kirkham, FS (Langley Research Center) Hunt, JL *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 181-199, 27 Ref.

ACKNOWLEDGMENT: EI
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10 172804
ROLE OF TECHNOLOGY IN AIR TRANSPORT--2000AD
The author discusses some of the activities in which the aerospace industry is engaged which could be important for the future of air transport. The author foresees further increases in aircraft size and significiant developments in both conventional and novel materials, advances in aerodynamics particularly concerning the maintenance of nonturbulent flow on swept wings of large aircraft at high subsonic Mach numbers, fuel efficiency improvements in fan jet propulsion systems and new developments in propeller or prop fan systems, and improvements in active aerodynamic control technology.

Wilkinson, KG (British Airways) *Aircraft Engineering* Vol. 49 No. 5, May 1977, pp 23-30

ACKNOWLEDGMENT: EI
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10 172920
THE ANCIENT ART OF FORECASTING
This article attempts to explain, in simple language, some of the basic techniques of forecasting. Trend analysis which involves graphical representation of past and future traffic figures is suitable only for some types of short-term forecasts. Graphs on logarithmic and semi-logarithmic graph paper, could show traffic as growing in a straight line and a constant percentage. Sinusoidal curves could be used to show seasonal and other variations in traffic. The gravitational forecast was developed, and it became possible to take into account all types of factors (independent variables) in lieu of, or in addition to, time in preparing forecasts. Computers accelerated progress in forecasting, and were used to verify whether or not various possible independent variables had relationship (correlation) with the traffic under study. It then became necessary to forecast the behaviour of the independent variables which thus become dependent variables, and econometric models were developed. However, it was found that past correlations became obsolete very quickly. An attempt was then made to control future events and led to the development or normative forecasting; policymaking and forecasting became more closely associated. In the Delphi approach specialist views from more than one field are incorporated in the forecast.

Air Transport World Vol. 15 No. 1, Jan. 1978, pp 46-47

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

10 173459
FORECASTING THE GROWTH OF WORLD AIR PASSENGER TRANSPORT [Previsioni di incremento del trasporto aereo di persone su scala mondiale]
A mathematical model to interpret the growth of air of turbomachine flutter to be used to estimate flutter the world's air routes (internal and internationa) shows a lower rate of increase than in past years, and identifies foreseeable levels of saturation. Calculations in this article exclude all charter flight traffic, and that of nations not yet members in 1976 of the organisation of international civil aviation. Internal air traffic of the Soviet union is also excluded because of the scarcity of available data. /TRRL/ [Italian]

Dadous, T Festa, E (Politechnico di Milan, Italy) *Rivista della Strada Analytic* Vol. 46 No. 435, Oct. 1977, pp 903-918, 2 Fig., 5 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-230366)

10 173697
FORECAST OF COMMUTER AIRLINES ACTIVITY
This report assesses the potential of the commuter airline industry including the identification of those short-haul low-density points that are likely prospects for future commuter service. The first section provides a national forecast of commuter airline emplanements, revenue passenger miles, number of aircraft operations and composition of fleet for 1975 to 1988. The second part of the report describes a model developed to disaggregate the activity forecast to individual points with existing service or anticipated future service, and provides forecasts for those points. /Author/

Deosaran, G Sweezy, H Van Duzee, R
Systems Analysis and Research Corporation FAA-AVP-77-28, July 1977, 72 pp, Tabs., Apps.

ORDER FROM: NTIS
AD-A044804

10 173852
STATE OF THE NATION'S AIR TRANSPORTATION SYSTEM. SUMMARY PROCEEDINGS OF A SYMPOSIUM, JUNE 3-4, 1976
The key note presentations, highlights of the panel discussions and the statement of issues which were presented at a 2-day symposium to analyze the state of the nations air transportation system are published here. The symposium focused on the status of specific areas such as new technologies, productivity, finances, and economics and on the potential impacts of proposed regulatory reform actions. The symposium expressed concern about the industry's economic health, and noted that federal government action will be a significant factor in the future success of the industry. New financial techniques may be required to develop and implement the technological promise of future generations of air transport. The most important issue as perceived by the industry is the course of action the federal government will take on airline deregulation or regulatory reform and the impact of such action. The importance of the travel growth forecast, the key design forces for the next generation, and the administrative constraints in the environmental and energy area which will dictate the future course of the industry are also discussed. The technical and financial issues relating to the solution of the problems are identified.

National Academy of Engineering Proceeding 1976, 72 pp

ORDER FROM: National Academy of Sciences, 2101 Constitution Avenue, NW, Printing and Publishing Office, Washington, D.C., 20418

10 173863
THE FUTURE OF AIR TRANSPORTATION TECHNICAL OVERVIEW
The air transportation system, it is noted, is a continually growing system. The fact that world revenue passenger miles are expected to double in the next ten years and rise by a more than equivalent amount in the ten years beyond, are good indications of this trend. The system continues to require airplanes of all sizes and most large airlines will continue to have a mixture of small, medium, and large aircraft. To offer the public adequate service, there will be additional point-to-point service, more time-of-day departures, and new destinations. In this overview, the economics involved in air transportation are presented as well as the relationship of technical trades associated with those economics. An overview is then presented of the status of technology leading to the definition of a technology package that can be incorporated in airplanes for delivery in the early 1980's. The replacement requirement for U.S. airline jet transports, when combined with growth, represents a market through 1985 of about $53 billion in 1977 dollars. The situation affords an opportunity for technological infusion which will reduce energy consumption per unit of transportation, will decrease community noise, and will aid in restoring airline financial health, assuming that capital formation requirements can be met.

Present at the AIAA Annual Meeting, Washington, D.C. January 10, 1977.

Steiner, JE
Boeing Company 1977, 11 pp, Figs.

ORDER FROM: Boeing Company, P.O. Box 3707, Boeing Corporate Product Evaluation, Seattle, Washington, 98124

10 174315
CIVIL TRANSPORT AVIATION--PROGRESS AND PROMISE
A review is presented of the progress and promise in the total air transportation system from the standpoint of passengers and freight, geography, technology, economics, regulation, airlines, and manufacturers.

Anglo-American Aeronautical Conference, 15th, London, England, 31

May-2 June 1977.
Steiner, JE (Boeing Company)
Royal Aeronautical Society Proceeding 1977, 16 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 174335
STOL IN SOUTHERN AFRICA--NOT IF, BUT WHEN
A comparison has been made between the STOL system and existing surface and air transport systems and their future developments. The parameters for a civil STOL aircraft and the requirements for a STOLport are presented, resulting in the suggestion of a possible STOLport site in the Johannesburg area. Steps for action, relating to organization and financing, are outlined.

Fritz, RJ (Witwatersrand University, South Africa) *South African Mechanical Engineer* Vol. 27 No. 8, Aug. 1977, pp 266-273

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

10 174469
ALTERNATIVE FUTURE SCENARIOS FOR THE NATIONAL AVIATION SYSTEM. VOLUME 1. EXECUTIVE SUMMARY
This study updated and expanded the five socioeconomic scenarios prepared for the FAA in the prior study similarly titled. These scenarios were revised to reflect changes in conditions since the original study and to incorporate new material that may better aid the FAA in policy analysis. Scenario sections on economics were greatly augmented to give substantive descriptions of the economic and financial processes, and a new sector on international conditions was added to each scenario. This volume contains an overview of study methods and results. Summaries are given of the five scenario narratives, and the chronology of key scenario events and the levels reached for major scenario variables are presented. (Author)
See also Volume 2, AD-A046 743.

Fein, E Donahue, C Oppenheimer, M Goodrich, D Becker, H
Futures Group Final Rpt. 276-72-05/01, Feb. 1977, 52 pp

Contract DOT-FA6WA-3855

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047084/9ST

10 174509
FAA AVIATION FORECASTS, FISCAL YEARS 1978-1989
This report contains the fiscal years 1978 to 1989 Federal Aviation Administration (FAA) forecasts of aviation activity and measures of workload at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the four major users of the national aviation system: air carriers, air taxi, general aviation and the military. This report also contains for the first time a specific forecast for commuter airlines. The forecasts have been prepared to meet the budget and manpower planning needs of the constituent units of FAA and to provide information that can be used by state and local authorities, by the aviation industry and the general public. The overall outlook throughout the forecast period is for moderate economic growth, declining unemployment, and decreasing inflation. Based on these assumptions, aviation activity is forecast to increase by Fiscal Year 1982 by 29 percent at towered airports, 32 percent at air route traffic control centers and 49 percent in flight services performed. The corresponding percentage increases for Fiscal Year 1989 are 49, 64 and 104, respectively. General aviation and air taxis (including commuters) will account for most of the growth in activity at FAA facilities. (Author)

Federal Aviation Administration FAA-AVP-77-32, Sept. 1977, 85 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047657/2ST

10 174961
DEMANDS AND NEEDS OF FUTURE TRANSPORTATION. PART 1. AIR TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)
The needs and demands for future air traffic control, airports, cargo aircraft, short takeoff aircraft, and air transportation in general are presented in this bibliography of Federally-funded research. Also included are studies on local air transportation needs and growth. (This updated bibliography contains 172 abstracts, 23 of which are new entries to the previous edition.)
Supersedes NTIS/PS-77/0054 and NTIS/PS-76/0045.

Lehmann, EJ
National Technical Information Service Feb. 1978, 177 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-78/0065/9ST

10 175963
FORECAST AND ANALYSIS OF INTERNATIONAL AIR TRAFFIC IN RELATION TO TRANSOCEANIC COMMUNICATION REQUIREMENTS. APPENDIX II
This appendix presents a more extensive description of the methodology and assumptions used in developing the SRI air traffic activity forecasting system. Specifically, it describes assumptions concerning the future market environment of aviation, the forecasting system developed to estimate levels of air traffic and derive peak instantaneous airborne counts, and the results of tests conducted to assess the effects of changing parameter assumptions on the forecast results. (Author)
See also Appendix 1, AD-A052 804.

Pozdena, RJ Gross, D Gorham, J Yee, D
SRI International Summ Rpt. FAA-RD-77/131-2, Dec. 1977, 99 pp

Contract DOT-FA75WA-3574

ACKNOWLEDGMENT: NTIS
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AD-A052808/3ST

10 176137
PASSENGERS IN CONTAINERS
A futuristic vision of future passenger and cargo transport is presented. To speed up lengthy transit operations, passengers would be accommodated in comfortable, compartment-like containers. Several diagrams show how such containers can be accommodated aboard an aircraft or a helicopter, on a truck, or in a railroad car. A system would result in great economy in both cost and time. Of particular importance is such a system for cargo traffic.
Tran-Transl. Into English from Sots. Industriya (Ussr), 21 Apr. 1977 p 4. Subm-Transl. By Transemantics, Inc., Washington, D. C.

Tarkhanovskiy, V
National Aeronautics and Space Administration NASA-TM-75078, Dec. 1977, 7 pp

Contract NASW-2792

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-18989/1ST

10 176746
THE ROTARY WING INDUSTRY--2001 A.D.
The future of the rotary wing industry is discussed with respect to the industry's past, the probable environment, the technological advancements and their significance. It is noted that the growth of the industry was spurred with the introduction of air-mobile concepts by the military during the early 1960's. Civil use of rotorcraft increased as military aircraft were adapted for commerical application. As regulatory agencies have become more familiar with rotorcraft and their operation, more stringent and meaningful regulations emerged. It is noted that low vibration of modern helicopters is attributed to improved blade and fuselge tuning and various passive and active isolation systems. Within technology itself there are four areas that the past has shown to be most important in advancing rotorcraft development: materials, power plants, aerodynamic efficiency and configurations. Two of the keys to success in the future rotorcraft industry. That are described, are: Increased safety, and lower cost-of-ownership. It is projected that by the next century, the number of major companies in the rotorcraft industry will be reduced to at least half; the number of units sold will increase more than doubling a linear projection based on the past market; the military will continue to provide scarce development funding for advanced technology efforts; new rotorcraft will have about the same empyt-to-gross mass ratio as today's machines, but the empty mass will include increased safety features and the aircraft will be designed to more stringent environmental requirements; and, all rotorcraft will be able to fly in, at least, light icing conditions.

Lynn, RR (Bell Helicopter Textron) *ICAO Bulletin* Vol. 33 No. 2, Feb. 1978, pp 12-17

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

10 176910
INTEGRATED LONG TERM PROGNOSIS FOR TRANSPORT DEMAND IN FREIGHT AND PASSENGER TRANSPORT IN THE FEDERAL GERMAN REPUBLIC UP TO THE YEAR 1990. SECTIONAL STUDY: PASSENGER TRANSPORT-GLOBAL DEVELOPMENT UP TO 1990 AND REGIONAL STRUCTURE IN THE YEAR 1990 [Integrierte Langfristprognose fuer die Verkehrsnachfrage im Gueter-und Personenverkehr in der Bundesrepublik Deutschland bis zum jahre 1990. Teilstudie: Personenverkehr--Globale Entwicklung bis 1990 und Regionale Struktur im jahre 1990]
The long term forecasts for passenger transport in the federal German republic should be a particularly useful decision aid for the planning of traffic routes. For this reason, with the aid of many methodological assumptions, the global development of passenger transport up to 1980 is estimated, divided in accordance with the reason for the journey and the type of transport (modal). A special prognosis is required for air transport. In addition to the global forecasts, the 79 districts in the federal republic are checked for expected special developments in individual journey purposes and types of traffic and estimates are made up to the year 1990. The study also demonstrates the movement in passenger traffic between the 79 districts, also taking into account the modal split in this case. [German]

Internationales Verkehrswesen Vol. 28 No. 1-2, Jan. 1977, pp 3-8, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-306613), Federal Institute of Road Research, West Germany
ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlerstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

10 176911
INTEGRATED LONG TERM FORECAST FOR TRAFFIC REQUIREMENTS FOR FREIGHT AND PASSENGER TRAFFIC IN THE FEDERAL REPUBLIC OF GERMANY TO THE YEAR 1990. PART STUDY: FREIGHT TRAFFIC ANALYSIS AND PROJECTED PLAN. [Integrierte Langfristprognose fuer die Verkehrsnachfrage im Gueter-und Personenverkehr in der Bundesrepublik Deutschland bis zum jahre 1990. Teilstudie: Gueterverkehr--Analyse und Projektion]
As a supplement to the forecast for passenger traffic an assessment of global and regional freight traffic in the federal German republic is made up to the year 1990. With the aid of a separately conducted project on social economic key data, the global and regional freight traffic are estimated according to traffic volume and traffic efficiency. The global rise in traffic is transferred to the various means of traffic in a modal split calculation. Separate calculations are carried out for the traffic across borders and through-traffic. In all forecasts the types of goods are combined in 12 categories of goods. Special attention is paid to regional forecasts of traffic and traffic division. Estimates are made regarding the regional inter-linking for the 79 areas of the federal German republic for the year 1990, whereby the development of statistically difficult to assess public freight transport is emphasised in the investigation, since on average 85% of freight transport in 1990 will be handled by public freight transport. [German]

Internationales Verkehrswesen Vol. 28 No. 3-4, Mar. 1976, pp 71-76, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-306617), Federal Institute of Road Research, West Germany
ORDER FROM: Federal Institute of Road Research, West Germany, Bruhlerstrasse 1, Postfach 510530, D-5000 Cologne 51, West Germany

10 178254
THE SHAPE OF THINGS TO COME
The general concensus today in the civil aviation industry is that between now and the year 2000 there will be no major design changes in the world's commercial aircraft. The reasons for this are largely economic. The cost of new aircraft continues to escalate, and the cost of fuel is still rising as available world supplies diminish. Research into advanced materials alone is already producing structures which combine enormously increased strength with significant reductions in weight. Fuel research is introducing synthetic fossil fuels, liquid hydrogen and nuclear power as potential power alternatives. Advanced wing configuration is another area of research that has shown models capable of combining enormous lift for heavy payloads with short-take-off-and-landing (STOL). Current research is now looking at the possibilities of using composite materials for the manufacturer of aircraft structural parts. Other research includes the use of synthetic kerosene, obtained from coal and shale, which could be mixed directly with petroleum-based fuels, giving an end-product whose properties would be similar to those of today's jet fuel. New aircraft, particularly those operating on the subsonic and transonic ranges, may benefit from current developments in using aerodynamics and entirely new concepts in the use of wing structures. The U.S. Space Shuttle is one vehicle that represents a radical departure from the norm. It can be considered the first offspring of the marriage between aerodynamics and space technology.

LaFond, CD, Editor-in-Chief (ICAO Bulletin) *UNESCO Courier* Apr. 1978, pp 26-32

ACKNOWLEDGMENT: UNESCO Courier
ORDER FROM: University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan, 48103

10 178577
PROSPECTIVE DEMAND FOR DIFFERENT MODES OF TRANSPORT
Factors necessary to the forecasting and planning of transport demand, particularly in a developing country, are enumerated. Determination of transport demand is based on material balances and transport balances in particular, interregional economic links, the magnitude of passenger traffic and the rising standard of living. The determination of the extent to which transport network is meeting demands is a complex problem. A comparison is made between the various modes of transport, e.g. road transport, railways, water transport and air transport. /TRRL/

Transport & Communications Bull for Asia & Pacific No. 51, 1977, pp 1-7

ACKNOWLEDGMENT: TRRL (IRRD 232741)
ORDER FROM: United Nations Publications, Room LX-2300, New York, New York, 10017

10 180137
PREVENTING ZERO-GROWTH AIR TRANSPORTATION
It is urged that a mass air transportation system be developed by increasing the number of VTOL aircraft and VTOLPORTS. Bottlenecks are foreseen in the air control system that relies on conventional takeoff and landing aircraft (CTOL); of particular concern is the unlikelihood, due partly to environmental considerations, that new airports suitable for large CTOL aircraft will be constructed in the near future. Procedures for increasing existing airport capacity are examined, and IFR helicopter operations are discussed. A program for expanding VTOL use is proposed; goals include federal aid for air transportation and subsides to V/STOL manufacturers.

Imaginative Engineering thru Education and Experience; Proceedings of the Southeast Region 3 Conference, Williamsburg, Virginia, April 4-6, 1977. (A78-17526 05-31).

Gilbert, GA (Gilbert (Glen A) and Associates)
Institute of Electrical and Electronics Engineers Proceeding 1977, pp 389-393

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-17569)
ORDER FROM: AIAA

A78-17569

10 180434
FORECASTING IN URBAN AND REGIONAL PLANNING CLOSED LOOPS: THE EXAMPLES OF ROAD AND AIR TRAFFIC FORECASTS
Attempts to forecast in situations in which the leading indicators are also used as policy variables are beset by a number of statistical problems which affect the specification of the forecasting model, estimation of its parameters, and the design of policy itself. The main effects are that when there is perfect policy feedback the forecasting model cannot be identified at all; when there is partial or imperfect feedback the forecasting model is collinear, underidentified, and least-squares parameter estimates will be biased. Estimation procedures available in closed loops are reviewed, and the application of these methods to road and air traffic forecasting is discussed.(a)

Bennett, RJ (Cambridge University, England) *Environment and Plann. s* Vol. 10 No. 2, Feb. 1978, pp 145-162, 5 Fig., 33 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-232841)
ORDER FROM: Pion Limited, 207 Brondesbury Park, London NW2 5JN, England

10 180719
FORECAST AND ANALYSIS OF INTERNATIONAL AIR TRAFFIC IN RELATION TO TRANSOCEANIC COMMUNICATION REQUIREMENTS. APPENDIX I

Further detailed data used for forecasting and analyzing air traffic activity for the Atlantic, Pacific and Indian Ocean basins is presented in this Appendix. This includes: (1) world area code list showing breakout of countries by OAG world area codes; (2) income and demographic growth rates for selected countries in the Atlantic, Pacific and Indian Ocean basins; (3) high and low global interregional traffic forecasts of annual and busy day flight frequencies for passenger and cargo segments covering 1972, 1975 with forecasts for 1980-1995; (4) instantaneous airborne counts by subzones; (5) total number of flights for all stage lengths contributing to the busy basin day, for the base year 1975, for each Atlantic basin IAC area by route segment regional origin-destination pair. (Author)

Pozdena, RJ Gross, D Gorham, J Yee, D
SRI International Summ Rpt. FAA-RD-77-131-1, Dec. 1977, 48 pp

Contract DOT-FA75WA-3574

ACKNOWLEDGMENT: NTIS
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AD-A052804/2ST

11 154091
ENERGY CONSUMPTION CHARACTERISTICS OF TRANSPORTS USING THE PROP-FAN CONCEPT

The fuel saving and economic potentials of the prop-fan high-speed propeller concept were evaluated for twin-engine commercial transport airplanes designed for 3333.6 km range, 180 passengers, and Mach 0.8 cruise. A fuel saving of 9.7% at the design range was estimated for a prop-fan airplane having wing-mounted engines, while a 5.8% saving was estimated for a design having the engines mounted on the aft body. The fuel savings and cost were found to be sensitive to the propeller noise level and to aerodynamic drag effects due to wing-slipstream interaction. Uncertainties in these effects could change the fuel savings as much as or-50%. A modest improvement in direct operating cost (DOC) was estimated for the wing-mounted prop-fan at current fuel prices. This improvement could become substantial in the event of further relative increases in the price of oil. The improvement in DOC requires the achievement of the nominal fuel saving and reductions in propeller and gearbox maintenance costs relative to current experience.

Boeing Company Final Rpt. NASA-CR-137937, Oct. 1976, 147 pp

Contract NAS2-9104

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-14029/1ST

11 155027
STUDY OF THE COST/BENEFIT TRADEOFFS FOR REDUCING THE ENERGY CONSUMPTION OF THE COMMERCIAL AIR TRANSPORTATION SYSTEM

Practical means were assessed for achieving reduced fuel consumption in commercial air transportation. Five areas were investigated: current aircraft types, revised operational procedures, modifications to current aircraft, derivatives of current aircraft and new near-term fuel conservative aircraft. As part of a multiparticipant coordinated effort, detailed performance and operating cost data in each of these areas were supplied to the contractor responsible for the overall analysis of the cost/benefit tradeoffs for reducing the energy consumption of the domestic commercial air transportation system. A follow-on study was performed to assess the potential of an advanced turboprop transport aircraft concept. To provide a valid basis for comparison, an equivalent turbofan transport aircraft concept incorporating equal technology levels was also derived. The aircraft as compared on the basis of weight, size, fuel utilization, operational characteristics and costs.

A Summary Report is also available from NTIS, N 77-15008/4ST.

Hopkins, JP
Lockheed-California Company Final Rpt. NASA-CR-137926, Aug. 1976, 331 pp

Contract NAS2-8612

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-15007/6ST

11 159078
THE POTENTIAL ROLE OF TECHNOLOGICAL MODIFICATIONS AND ALTERNATIVE FUELS IN ALLEVIATING AIR FORCE ENERGY PROBLEMS

This report examines short-and long-term measures to reduce the consumption of petroleum jet fuels by the Air Force. Engine retrofits and aerodynamic modifications to existing aircraft can save significant quantities of jet fuel; however, savings in fuel expenditures are not enough to offset high initial costs of engine retrofits. If accomplished early in an aircraft's life cycle, relatively lower costs of modest aerodynamic modifications may be recoverable through savings in fuel expenditures. Synthetic JP fuels derived from oil shale or coal appear to be the most attractive future alternatives to petroleum jet fuels. If the foreign oil cartel maintains its price-setting effectiveness and synthetic fuels industry develops in the United States, development of an Air Force capability to interchangeable use fuels derived from crude oil, oil shale, or coal could be economically attractive and enhance the Air Force's position in the jet fuel marketplace. (Author)

Gebman, JR Stanley, WL Weyant, JP Mikolowsky, WT
Rand Corporation Intrm Rpt. R-1829-PR, Dec. 1976, 168 pp

Contract F49620-77-C-0023

ACKNOWLEDGMENT: NTIS
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AD-A039597/0ST

11 163581
NATIONAL AIRLINES FUEL MANAGEMENT AND ALLOCATION MODEL

Th Fuel Management and Allocation Model determines the optimal strategy for fueling aircraft and can be used to support both short and long-term planning. It has been used operationally by the Fuels Management and Flight Control Departments of National Airlines for over two years, resulting in multi-million dollar savings. The model specifies the best fueling station and vendor for each flight, based on prices, availability, fuel burn, flight data, and cost of tankerage. The model also used extensive sensitivity analysis techniques to alert management as to when a new policy may be required. /Author/

Darnell, DW Loflin, C *Interfaces* Vol. 7 No. 2, Feb. 1977, 16 pp, 11 Fig., 1 Tab., 2 Ref., 5 App.

ORDER FROM: Institute of Management Sciences, 146 Westminster Street, Providence, Rhode Island, 02903

11 164933
AIRFRAME TECHNOLOGY FOR ENERGY EFFICIENT TRANSPORT AIRCRAFT

Fuel costs comprise a major portion of air transport operating costs. Thus, energy efficiency is an essential design goal for future transport aircraft. Advanced composite structures, advanced wing geometries, and active control systems all promise substantial benefits in fuel efficiency and direct operating cost for derivative and new aircraft introduced by 1985. Technology for maintenance of a laminar boundary layer in cruise offers great benefits in fuel efficiency and direct operating cost and may be ready for application to transports introduced in the 1990's. NASA and the air transport industry are cooperating in a comprehensive Aircraft Energy Efficiency Program to expedite the introduction of these advanced technologies into production aircraft.

Prepared for SAE Meeting 29 Nov.-2 Dec. 1976.

Leonard, RW (Langley Research Center) Wagner, RD
Society of Automotive Engineers Preprint SAE 760929, 1976, 16 pp, 47 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 166183
PETROLEUM MARKET SHARES

This is one of a continuing series of reports of monitored monthly changes in the refiner sales distribution and the retail market shares of selected refined petroleum products. Estimates of volume sales and market shares are based on monthly sample surveys of refiners and independent marketers.

(PC A00) Paper copy available on subscription, North American Continent prices $30.00/year; single copy price PC$3.25, MF$3.00; all others write for quote.

National Energy Information Center Monthly Rpts., 1977, n.p.

ACKNOWLEDGMENT: NTIS
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NTISUB/C/152

11 166214
EXAMINATION OF THE COSTS, BENEFITS AND ENERGY CONSERVATION ASPECTS OF THE NASA AIRCRAFT FUEL CONSERVATION TECHNOLOGY PROGRAM

The costs and benefits of the NASA Aircraft Fuel Conservation Technology Program are discussed. Consideration is given to a present worth analysis of the planned program expenditures, an examination of the fuel savings to be obtained by the year 2005 and the worth of this fuel savings relative to the investment required, a comparison of the program funding with that planned by other Federal agencies for energy conservation, an examination of the private industry aeronautical research and technology financial posture for the period FY 76-FY 85, and an assessment of the potential impacts on air and noise pollution. To aid in this analysis, a computerized fleet mix forecasting model was developed. This model enables the estimation of fuel consumption and present worth of fuel expenditures for selected commerical aircraft fleet mix scenarios.

Ultrasystems, Incorporated NASA-CR-152683, REPT-8291-01, Nov. 1975, 66 pp

Contract NASW-2859

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-23007/6ST

11 166216
COST/BENEFIT TRADEOFFS FOR REDUCING THE ENERGY CONSUMPTION OF THE COMMERCIAL AIR TRANSPORTATION SYSTEM. VOLUME 1: TECHNICAL ANALYSIS

The effectiveness and associated costs of operational and technical options for reduced fuel consumption by Douglas aircraft in the domestic airline fleet are assessed. Areas explored include alternative procedures for airline and flight operations, advanced and state of the art technology, modification and derivative configurations, new near-term aircraft, turboprop configuration studies, and optimum aircraft geometry. Data for each aircraft studied is presented in tables and graphs.

Kraus, EF
Douglas Aircraft Company, Incorporated Final Rpt. NASA-CR-137923, MDC-J7340-V-1, June 1976, 289 pp

Contract NAS2-8618

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-23072/0ST

11 166217
COST/BENEFIT TRADEOFFS FOR REDUCING THE ENERGY CONSUMPTION OF THE COMMERCIAL AIR TRANSPORTATION SYSTEM. VOLUME 2: MARKET AND ECONOMIC ANALYSES

The impact of the most promising fuel conserving options on fuel consumption, passenger demand, operating costs, and airline profits when implemented into the U.S. domestic and international airline fleets is assessed. The potential fuel savings achievable in the U.S. scheduled air transportation system over the forecast period, 1973-1990, are estimated.

Vanabkoude, JC
Douglas Aircraft Company, Incorporated Final Rpt. NASA-CR-137924, MDC-J7340-V-2, June 1976, 374 pp

Contract NAS2-8618

ACKNOWLEDGMENT: NTIS
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N77-23073/8ST

11 166569
AN EVALUATION OF VERY LARGE AIRPLANES AND ALTERNATIVE FUELS: EXECUTIVE SUMMARY

Candidate applications of very large airplanes include: strategic airlifter, tanker, missile launcher, tactical battle platform, maritime air cruiser, and C3 platform. This report summarizes AD-A040 532 which explored the military utility of very large airplanes (over 1 million pounds gross weight) and examined several alternative fuels that could be used by such airplanes.

Executive Summary to Rept. no. R-1889-AF, AD-A040 532. See also Rept. no. R-1829-PR, AD-A039 597.

Mikolowsky, WT
Rand Corporation Intrm Rpt. R-1889/1-AF, Dec. 1976, 40 pp

Contract F49620-77-C-0023

ACKNOWLEDGMENT: NTIS
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AD-A042112/3ST

11 167014
FULL-SCALE AIRCRAFT CRASH TESTS OF MODIFIED JET FUEL

Crash tests were conducted with two A3 and two RB66 aircraft under impact-survivable crash conditions. The wing tanks in the first RB66 aircraft contained Jet A fuel modified with an 0.7-percent polymeric additive. The aircraft was crash tested into the specially constructed test site at 104.6 knots. The fuel mist generated by the fuel released from four crash-inflicted openings in the front wing spar was not ignited by the array of ignition sources. The wing tanks in the second RB66 aircraft were filled with JET A fuel modified with 0.5-percent of the same polymeric additive. The aircraft was crashed into the test site at 102.4 knots. The test conditions for the second RB66 test were made more severe by increasing the fuel temperature, partially drilling out areas in the front spar to increase the opened fuel spillage area, and by adding four fuel release openings under the wing, larger ignition sources, and operating the engines. The fuel mist burst into flame and followed the aircraft down the test site, continuing to burn until extinguished by the firefighting crew. These full-scale tests indicate that modified fuels have a potential for reducing the postcrash fire hazard and that small-scale tests should be conducted which are representative of full-scale crash conditions to determine the additive concentration to be used in any future crash tests. (Author)

Ahlers, RH
National Aviation Facilities Experimental Center Final Rpt. FAA/RD-77-13, FAA-NA-77-35, July 1977, 97 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043843/2ST

11 167201
PRELIMINARY ANALYSIS OF AIRCRAFT FUEL SYSTEMS FOR USE WITH BROADENED SPECIFICATION JET FUELS

An analytical study was conducted on the use of broadened specification hydrocarbon fuels in present day aircraft. A short range Boeing 727 mission and three long range Boeing 747 missions were used as basis of calculation for one-day-per-year extreme values of fuel loading, airport ambient and altitude ambient temperatures with various seasonal and climatic conditions. Four hypothetical fuels were selected; two high-vapor-pressure fuels with 35 kPa and 70 kPa RVP and two high-freezing-point fuels with-29 C and -18 C freezing points. In-flight fuel temperatures were predicted by Boeing's aircraft fuel tank thermal analyzer computer program. Boil-off rates were calculated for the high vapor pressure fuels and heating/insulation requirements for the high freezing point fuels were established. Possible minor and major heating system modifications were investigated with respect to heat output, performance and economic penalties for the high freezing point fuels.

Pasion, AJ Thomas, I
Boeing Company Final Rpt. NASA-CR-135198, D6-44538, June 1977, 82 pp

Contract NAS3-19783

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-27241/7ST

11 168762
FUELS AND ENERGY DATA: UNITED STATES BY STATES AND CENSUS DIVISIONS, 1974

Salient information on reserves, production, and consumption of fuels and energy by State is summarized. Reserve and production data are shown for each of the fossil fuels (coal, crude oil, natural gas liquids, and natural gas) and for uranium. The consumption data of each of the major consuming sectors (household-commercial, industrial, transportation, electric power, and miscellaneous) are broken down by energy source (coal, petroleum, natural gas, hydropower, and nuclear). In addition, total energy consumption in the Nation in 1974 is compared with consumption in 1973 and 1975.

See also report dated Dec 76, PB-262 362.

Crump, LH
Bureau of Mines Infor Circ BuMines-IC-8739, 1977, 171 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-271093/7ST

11 168770
EFFECTIVE FUEL CONSERVATION PROGRAMS COULD SAVE MILLIONS OF GALLONS OF AVIATION FUEL

In 1976 the airlines used about 9.5 billion gallons of jet fuel. This report discusses Federal actions to conserve fuel used by the airlines and suggests ways additional fuel savings can be realized.

Report to the Congress.

General Accounting Office CED-77-98, Aug. 1977, 78 pp

ACKNOWLEDGMENT: NTIS
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PB-271249/5ST

11 168858
TRENDS IN REFINERY CAPACITY AND UTILIZATION. PETROLEUM REFINERIES IN THE UNITED STATES. FOREIGN REFINERY EXPORTING CENTERS
Data concerning actual and planned refinery capacities are presented for refineries in the U.S., Caribbean area, Middle East, Eastern Canada, Italy, and Singapore. Net exportable capacities are given through 1980.
See also report dated Jun 76, PB-256 966.

Peer, EL Marsik, FV
Department of Energy Ann Rpt. FEA/G-77/281, June 1977, 56 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-272339/3ST

11 169014
TRANSPORTATION ENERGY CONSERVATION DATA BOOK: SUPPLEMENT III
This document is Supplement III to Edition I of the Transportation Energy Conservation Data Book (ORNL-5198; EAPA 3:527), which was published by Oak Ridge National Laboratory in October 1976. This series of documents is intended to provide a desk-top reference for use by the Transportation Energy Conservation Division of the Energy Research and Development Administration. The supplements contain statistics that expand and refine data presented in Edition I. A variety of tables, charts, maps, and graphs is used in this volume to present statistical data on energy use and energy-related activity in the transportation sector. A major aspect of the data in this supplement focuses on energy supply to the transportation sector. Data on characteristics of transportation modes, fuel consumption characteristics, and conservation alternatives are also included in this supplement and serve to augment and update information presented in Edition I. The glossary represents a significant expansion. A list of references is provided, an index, and an annotated bibliography (showing recent acquisitions) are included at the end of this supplement. (ERA citation 02:043490)
See also Edition I

Loebl, AS
Oak Ridge National Laboratory, Department of Energy May 1977, 155 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

ORNL-5248

11 169016
CONSENSUS FORECAST OF U.S. ENERGY SUPPLY AND DEMAND TO THE YEAR 2000
Methods used in forecasting energy supply and demand are described, and recent forecasts are reviewed briefly. Forecasts to the year 2000 are displayed in tables and graphs and are used to prepare consensus forecasts for each form of fuel and energy supply. Fuel demand and energy use by consuming sector are tabulated for 1972 and 1975 for the various fuel forms. The distribution of energy consumption by use sector, as projected for the years 1985 and 2000 in the ERDA-48 planning report (Scenario V), is normalized to match the consensus energy supply forecasts. The results are tabulated listing future demand for each fuel and energy form by each major energy-use category. Recent estimates of U.S. energy resources are also reviewed briefly and are presented in tables for each fuel and energy form. The outlook for fossil fuel resources to the year 2040, as developed by the Institute for Energy Analysis at the Oak Ridge Associated Universities, is also presented. (ERA citation 02:045690)

Lane, JA
Oak Ridge National Laboratory, Department of Energy Feb. 1976, 31 pp

Contract W-7405-ENG-26

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11 169116
LIFESTYLES AND HOUSEHOLD ENERGY USE: 1973 AND 1975 NATIONAL SURVEYS. CODE BOOK AND DATA PROCESSING GUIDE
The Energy and Lifestyles data documentation and file are a compilation of data collected in two national housing unit surveys. The first survey conducted in May 1973 collected data for 1455 households and the housing units in which those households resided. The sample was designed to provide an oversampling of low income households. The survey was repeated in 1975 for 3140 households, of which approximately 1000 were repeat households from the 1973 survey. Therefore, on a record dump, some households will have a large block of data, whereas, others will have some blanks for the missing information either from 1973 or 1975. Among the variables collected on the survey are: (1) characteristics, size, construction, and amenities of housing units; (2) economic and demographic data on households; (3) actual consumption and cost of electricity and natural gas in residential use; and estimated cost of fuel oil; (4) characteristics of equipment used for space heating and cooling, as well as water heating; (5) auto ownership and usage; (6) personal transportation behavior; (7) possession of appliances and other energy using household conveniences; and (8) changes in energy-related behavior and attitudes toward energy consumption since energy shortages first came to widespread public attention.
For data file on magnetic tape see PB-272 448.

Nicoletti, N
Department of Energy FEA/B-77/342a, FEA/DF-77/001a, Sept. 1977, 233 pp

ACKNOWLEDGMENT: NTIS
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PB-272449/0ST

11 169117
LIFESTYLES AND HOUSEHOLD ENERGY USE: 1973 AND 1975 NATIONAL SURVEYS
The Energy and Lifestyles data documentation and file are a compilation of data collected in two national housing unit surveys. The first survey conducted in May 1973 collected data for 1455 households and the housing units in which those households resided. The sample was designed to provide an oversampling of low income households. The survey was repeated in 1975 for 3140 households, of which approximately 1000 were repeat households from the 1973 survey. Therefore, on a record dump, some households will have a large block of data, whereas, others will have some blanks for the missing information either from 1973 or 1975. Among the variables collected on the survey are: (1) characteristics, size, construction, and amenities of housing units; (2) economic and demographic data on households; (3) actual consumption and cost of electricity and natural gas in residential use; and estimated cost of fuel oil; (4) characteristics of equipment used for space heating and cooling, as well as water heating; (5) auto ownership and usage; (6) personal transportation behavior; (7) possession of appliances and other energy using household conveniences; and (8) changes in energy-related behavior and attitudes toward energy consumption since energy shortages first came to widespread public attention.
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Carlson, LT Nicoletti, N Fuller, R
Department of Energy FEA/B-77/342, FEA/DF-77/001, 1975, n.p.

ACKNOWLEDGMENT: NTIS
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PB-272448/2ST

11 169118
ENERGY CONSERVATION AND THE ENVIRONMENT
The research emphasizes energy conservation in the residential sector. Experimental investigations attempt to determine optional insulation standards for mobile homes. During the reporting period, the authors completed a two-year program of analysis of opportunities for energy savings in transportation. This program started with a comparison of energy intensiveness for the various transportation modes. Subsequent research was devoted to detailed analysis of automobiles (the most widely used mode), airplanes (the most energy intensive mode), and bicycles (the least energy

intensive mode). Policy options were reviewed to determine potential impact in reducing overall energy consumption, reducing the energy intensiveness of a mode, and in promoting shifts toward the less energy intensive modes. In the statistical analysis of electricity demand growth, earlier projections are compared to actual recent experience. The comparison shows a clear advantage in using the econometric models over the traditional approach of extrapolating previous trends. The first phase of research on coal supply costs has been completed and findings demonstrate a sharp rise in costs for surface mining on steep slopes. This document includes brief summaries of results; each section lists references to more exhaustive topical reports and technical papers.

Carlsmith, RS
Oak Ridge National Laboratory, National Science Foundation Prog Rpt. ORNL-NSF-EP-77, NSF/RA/N-74-100, Sept. 1974, 72 pp

Contract W-7405-eng-26

ACKNOWLEDGMENT: NTIS
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PB-272428/4ST

11 169221
AN ANALYSIS OF FUEL CONSERVATION THROUGH AIRCRAFT TOWING

This paper presents an analysis of aircraft towing at the top twenty air carrier airports in the United States. The study of towing aircraft analyzes the economic feasibility of two towing scenarios: towing arrivals and departures, towing departures only. The analysis has been conducted under assumptions which yield an upper bound (high estimates) of fuel savings and a lower bound (low estimates) of the costs involved. A number of operational factors which would reduce the fuel savings and further increase the cost of towing have been identified but not explicitly accounted for in the analysis. The environmental benefits (noise and pollution reduction) of aircraft towing have not been considered in this analysis. This analysis indicates that no towing scheme is economically feasible unless the price of fuel increases by at least 150% to 200% more (over 1974 prices) without any increase in crew costs. If, however, future conditions require that fuel be conserved at all costs, then towing schemes would yield a savings of 0.7% to 1.3% of the total air carrier fuel usage at an additional net annual cost of $21 million to $90 million.

Sinha, AN
Mitre Corporation, Federal Aviation Administration Tech Rpt. MTR-6790, Feb. 1975, 43 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
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PB-274586/7ST

11 169600
THE ENERGY SUPPLY PLANNING MODEL. VOLUME I. MODEL STRUCTURE AND USE

In late 1973, a growing national perception of the degree of U.S. dependence on foreign oil supplies stimulated the proposal of several U.S energy policies. These policies were generally aimed at reducing, or at least varying, demand for specific energy forms and devising different schemes to supply sufficient energy from domestic resources at the earliest possible data. To compare and evaluate these proposals, a means was desired for converting the proposed policies into strategies and programs that would establish, primarily, 'critical path facilities' and, in so doing, would make possible judgements on the feasibility of the proposed policies. After some reflection on the complexities of an undertaking of this kind, it was decided to generate a consistent means of converting proposed U.S. energy supply policies to annual schedules of facilities and the capital, manpower, and material resources required to bring them on-line. This, it was believed, would constitute the first step toward determining the feasibility of proposed policies. This report documents the study. The structure and function of the Energy Supply Planning Model are described and its use illustrated. Both the modeling effort and the development of the supporting data base are at a point where the model may be used intelligently for energy supply planning.

See also Volume 2, PB-245383, TRIS 169601.

Carasso, M Gallagher, JM Sharma, KJ Gayle, JR Barany, R
Bechtel Corporation, National Science Foundation Final Rpt. NSF-10900-II-1, Aug. 1975, 244 pp

Contract NSF-C867

ACKNOWLEDGMENT: NTIS
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PB-245382/7ST

11 169601
THE ENERGY SUPPLY PLANNING MODEL. VOLUME II. USER'S MANUAL AND APPENDICES

The specific modeling work reported here was stimulated by the need to explore the feasibility of proposed U.S. energy policies in terms of the requirements for specific societal resources associated with the construction and operation of energy supply and energy transportation facilities needed to implement these energy supply policies. The Energy Supply Planning Model is designed to convert future (1975 to 1995) energy mixes to resource requirements schedules. With this planning tool, the feasibility of various proposed mixes can be assessed in terms of the time, capital, manpower, materials, and construction schedules required for the specified energy supply system. In carrying out the modeling efforts, special emphasis was placed on developing a rather transparent planning model where the user can test the implications of different energy policy options.

See also Volume 1, PB-245 382.

Carasso, M Gallagher, JM Sharma, KJ Gayle, JR Barany, R
Bechtel Corporation, National Science Foundation Final Rpt. NSF-10900-II-2, Aug. 1975, 331 pp

Contract NSF-C867

ACKNOWLEDGMENT: NTIS
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PB-245383/5ST

11 170820
ENERGY EFFECTS, EFFICIENCIES, AND PROSPECTS FOR VARIOUS MODES OF TRANSPORTATION

Conservation of energy used for transportation is of vital concern to the nation. This report of the Transportation Research Board details the efficiencies of various vehicles and modes for both passengers and freight under various conditions. Modes considered include highway, bus, rail, air, water, bicycle, and pipelines. The potential impacts of alternative energy-conservation options are evaluated, and research needs are identified. /Author/

NCHRP Project 20-5 FY' 75 (Topic 7-05) sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

NCHRP Synthesis of Highway Practice No. 43, 1977, 57 pp, 21 Fig., 40 Tab., 59 Ref., 2 App.

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11 170859
FUEL ECONOMY: THE NEXT STAGE

A consideration of how designing specifically for fuel efficiency could affect the aircraft industry. Several design improvements are feasible. Airframe improvements could result in a fuel efficiency increase of 20 to 30 percent over the next decade, and other improvements could result in a saving of up to 40 percent. Such design details could overcome noise problems in the concorde and give about 50 percent fuel efficiency improvement by 1985. Greater fuel efficiency may encourage airlines to pay more for aircraft and this will help manufacturers face escalating launch costs for new aircraft.

Wilkinson, K (Rolls-Royce Limited) *Flight International* Vol. 109 No. 3490, Jan. 1976, p 227, Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: IPC Transport Press

11 172704
JET FUEL QUALITY CONSIDERATIONS

The compatibility of advanced combustion systems with the highly aromatic contents of synthetic fuels processed from coal or oil shale is discussed. A significant saving in fuel cost can be realized by using aviation kerosenes having higher densities. Thus, fuels of higher aromatic content-- often believed to be of inferior quality by some individuals --may actually be considered premium fuel by some operators. A representative of one large domestic airline claims that he can save approximately half a million dollars annually in fuel costs by using fuels containing one percent more aromatics.

Shayeson, MW (General Electric Aircraft Engine Group) *Shell Aviation News* No. 440, 1977, pp 26-31

ACKNOWLEDGMENT: EI
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11 172712
HIGH FUEL ECONOMY IN AN AIRCRAFT PISTON ENGINE WHEN OPERATING ULTRALEAN

This paper presents the results of Phase II of the Hydrogen Enrichment for Aircraft Piston Engines Program. In Phase II, a Lycoming TIO-541-E engine was equipped with a gasoline operated hydrogen generator and installed on the dynamometer stand of the experimental facility at AVCO-Lycoming Division. A matrix of lean-out curves at sea level for different spark advances, hydrogen enrichment rates and power levels were obtained. An analysis of these data shows that while the lean-out to very low equivalence ratios with hydrogen enrichment does not present any difficulty, it seems that for certain types of engines one may achieve even better results with gasoline only, if the engine is properly timed. It has been found also that in this ultralean region, power recovery can be achieved by boosting the manifold pressure without exceeding the engine red line temperatures even at relatively high powers. Test cell altitude checks confirm the possibility of utilizing certain ultralean techniques at useful altitudes, without overheating the engine or inducing detonation. With proper timing, one can run the engine ultralean (fuel/air ratios as low as 0.05) with gasoline only during a steady-state operation without sacrificing performance (except for critical altitude). Under such conditions, fuel economy improvements of up to 20% have been obtained. The emission measurements conducted so far appear to indicate that, if these techniques can be implemented during taxi, idle, and approach, it may be possible to meet the Federal Emissions Standards.
Prepared for SAE Meeting, 29 March-1 April 1977.

Chirivella, JE (California Institute of Technology) Duke, LA Menard, WA
Society of Automotive Engineers Preprint SAE 770488, 1977, 20 pp

ACKNOWLEDGMENT: EI
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11 172726
ENERGY-TURN-RATE CHARACTERISTICS AND TURN PERFORMANCE OF AN AIRCRAFT

A convenient aerodynamic index of the energy cost of turning an aircraft is the energy required to overcome its air resistance per unit mass per turn, and it is termed specific energy of turn (SET). This index and the engine characteristics determine the fuel requirements. Evidently, reduction of SET at the design stage could lead to an increase in the range, or a reduction in the aircraft weight. This paper developes the analytical basis for SET and discusses a suitable representation of the drag polar. Analytical relations for minimum SET are subsequently obtained, and turn performance is then discussed in terms of SET-turn-rate characteristics. An illustrative example is given to show how the characteristics can be conveniently used in a parametric study.

Yajnik, KS (National Aeronautics Laboratory, India) *Journal of Aircraft* Vol. 14 No. 5, May 1977, pp 428-433, 2 Ref.

ACKNOWLEDGMENT: EI
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11 172779
AVIATION USAGE OF LIQUID HYDROGEN FUEL--PROSPECTS AND PROBLEMS

If worldwide air transportation is to continue to grow as forecast, a fuel must be found to supplant petroleum-based kerosene. The new fuel must be available universally without hazard of control by cartel, and must meet fundamental requirements of economics, safety, performance and environmental considerations. Hydrogen is found to provide this potential. The results of studies performed to investigate the feasibility, practicability, and potential advantages/disadvantages of using liquid hydrogen as fuel in both subsonic and supersonic commercial transport aircraft for initial operation in the 1990-2000 time period are discussed.

Brewer, GD (Lockheed-California Company) *International Journal of Hydrogen Energy* Vol. 1 No. 1, 1976, pp 65-69, 11 Ref.

ACKNOWLEDGMENT: EI
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11 172797
POTENTIAL OF TURBOPROP POWERPLANTS FOR FUEL CONSERVATION

The turboprop propulsion system may offer the air transportation industry one of the most significant means of achieving reduced operating costs through large reductions in fuel consumption. The prop-fan high speed propeller concept allows the superior propulsive efficiency exhibited by the turboprop to be extended to cruise speeds compatible with current turbofan aircraft. Comparison of a prop-fan and a turbofan powered aircraft, each designed on an equal technology, equal mission, and equal comfort basis is used to illustrate the prop-fan benefits. Accountability for the differences in the installation requirements of each propulsion system is included.

Foss, RL (Lockheed-California Company) Hopkins, JP *Acta Astronautica* Vol. 4 No. 1-2, Jan. 1977, pp 53-75, 6 Ref.

ACKNOWLEDGMENT: EI
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11 172811
EVALUATION OF AN IMPROVED METHOD OF GAS-FREEING AN AVIATION FUEL STORAGE TANK

A new technique is described for the gas-freezing of large storage tanks used for aviation fuel. The technique involves the use of natural and mechanical ventilation, together with an air-driven pump for removal of liquid residues from the irregular bottom of the tank. An assessment was made by gas-freeing a 4500 cu m (1 M gal) tank in which the atmosphere was monitored using portable flammable gas detectors and checked by the analysis of samples using chromatography. The new technique was much quicker than the traditional method of gas-freeing and was more controlled so that a work schedule could be devised in advance with confidence.

Fardell, PJ Houghton, BW *Journal of Hazardous Materials* Vol. 1 No. 3, Nov. 1976, pp 237-251

ACKNOWLEDGMENT: EI
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11 172816
FUEL CONSERVATIVE PROPULSION CONCEPTS FOR FUTURE AIR TRANSPORTS

In a search for potential methods of reducing future air transport fuel consumption, advanced conventional turbofan and more unconventional propulsion systems were examined. Early results encouraged a more detailed evaluation of an advanced Brayton cycle gas generator in a turbofan engine or geared to an advanced multi-bladed, small diameter propeller. The fuel savings potential and operating costs are estimated for the turbofan and turboprop systems to assess both the energy conservation possibilities and the airline economic benefits.
Prepared for SAE Meeting, May 18-20, 1977.

Gray, DE (Pratt and Whitney Aircraft) Witherspoon, JW
Society of Automotive Engineers Preprint SAE 760535, 1977, 11 pp, 10 Ref.

ACKNOWLEDGMENT: EI
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11 172821
DEVELOPING AN AUTOMATIC GRADE MONITOR FOR AVIATION FUELS

Shell Research Limited has developed a simple, fail-safe automatic grade monitor device that identifies fuel grade and shuts down the supply system when an unacceptable fuel is detected. The rare occasions where cumulative errors may prove hazardous to aircraft operations can now be further prevented by the availability of the fuel grade monitor. With this device we plan not only to achieve higher standards of contamination control, but also to make a significant contribution to fuel quality assurance and safety in flight. Moreover, the device has the potential for wider use in other applications, notably for the monitoring of fuel supplies to domestic or industrial appliances.

Whittle, J Hardy, INM *Shell Aviation News* Vol. 437 1976, pp 20-23

ACKNOWLEDGMENT: EI
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11 173478
COMBUSTION CONSIDERATIONS FOR FUTURE JET FUELS
This paper presents recent results which contribute to the combustion technology base necessary for the future development of aircraft jet fuels from non-petroleum resources. Specifically, the effects of fuel hydrogen and nitrogen content were studied using a T56 combustor rig. Although most of this work has involved fuel blending to simulate alternate fuel properties, data acquired using an actual oil shale jet fuel were included. Future directions for alternate jet fuel combustion efforts are summarized. Recommendations range from an expanded scope of combustor and engine testing to required fundamental combustion research.

Intl Symposium on Combustion (16th), MIT, Cambridge, Massachusetts, 15-20 August 1976.

Blazowski, WS (Wright-Patterson Aeronautical Laboratory)
Combustion Institute Proceeding 1976, p 1631, 14 Ref.

ACKNOWLEDGMENT: EI
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11 173492
THERMAL EFFICIENCY AND COST OF PRODUCING HYDROGEN AND OTHER SYNTHETIC AIRCRAFT FUELS FROM COAL
A comparison is made of the cost and thermal efficiency of producing liquid hydrogen, liquid methane and synthetic aviation kerosene from coal. These results are combined with estimates of the cost and energy losses associated with transporting, storing, and transferring the fuels to aircraft. The results of hydrogen-fueled and kerosene-fueled aircraft performance studies are utilized to compare the economic viability and efficiency of coal resource utilization of synthetic aviation fuels.

Witcofski, RD (Langley Research Center) *International Journal of Hydrogen Energy* Vol. 1 No. 4, 1977, pp 365-377, 13 Ref.

ACKNOWLEDGMENT: EI
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11 173833
THE AVAILABILITY OF JET FUEL--TOMORROW AND THE DAY AFTER
Looking at the next two decades the concern is whether the production of kerosene from petroleum will be sufficient to meet the expected air transport sector demand. Since the 1973/74 fuel crisis, aviation in general has made considerable efforts to limit the growth of fuel consumption. The benefits of energy-efficient aircraft will not be felt to any significant degree for at least a decade. Part of the air transport industry's problem is that it is completely reliant on hydrocarbon fuels, and the two most frequently postulated methods of reducing hydrocarbon consumption appear to have serious drawbacks. An analysis of recent past trends in aviation fuel consumption is presented in both tabular and graphic form. There are four basic options to meet the anticipated shortages of petroleum in the long term: Division of oil to specific uses; developing new generations of low-fuel-use vehicles; synthesis of hydrocarbon fuels from coal or shale; and, introduction of alternative fuels. It is expected that supplies for the air transport industry will not be a problem during the next ten years. Beyond 1985 there could be some scarcity of crude oil. To meet this challenge, there will have to be diversion of petroleum resources to particular preferred sectors, including air transportation, combined with the development of large-scale synthesis of liquid hydrocarbon fuels.

This article is based on two papers--The Availability of Jet Fuel Over the Next Two Decades by C.P. Dalton presented at IATAAGM, Madrid, 1977, and Have Energy will Travel by J.E. Allen presented at Royal Aeronatucal Society's 15th Anglo-American Conference, London, 1977.

Interavia Vol. 33 Jan. 1978, pp 39-42

ACKNOWLEDGMENT: Interavia
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11 173850
ENERGY CONSUMPTION AND THE AIR TRANSPORTATION SYSTEM IN METROPOLITAN WASHINGTON: IMPLICATIONS FOR THE FUTURE
In the Washington, D.C. SMSA, the air transportation system is a significant consumer of energy, particularly the air carrier airports, Washington National and Dulles International. In this analysis of energy consumption, these airports are viewed both as a major land use requiring electric power, heat and air conditioning on the scale of a large industrial park, and as a link in a nationwide and international air transportation network, and as such, the provider of jet fuel for aircraft departing from the airport. This report estimates current usage and projects consumption of jet fuel, electric power, fuel oil and natural gas for Dulles, National and Andrews AFB for 1980, 1985 and 1995. The region's public use general aviation airports are also included, with forecasts of aviation fuel only being made for the airports as a total group, rather than individually. The report concludes with suggested energy conservation measures. /Author/

Sponsored by the Department of Housing and Urban Development, Washington, D.C.

Clark, PH
Metropolitan Washington Council of Governments, (CPA-DC-03-39-1017) Final Rpt. Sept. 1976, 43 pp, Tabs.

ACKNOWLEDGMENT: Metropolitan Washington Council of Governments
ORDER FROM: Metropolitan Washington Council of Governments, 1225 Connecticut Avenue, NW, Washington, D.C., 20036

11 173934
FUEL CONSERVATION AND APPLIED RESEARCH
This article discusses the importance of generic applied research with the aim of encouraging both the technical and political support of a program that would be appropriate and useful for the common good. A number of past, present, and future examples of applied research efforts related to fuel conservation are described, and an institutionalization of the means by which such efforts can be organized and utilized for an effective long-term fuel conservation program are suggested. The role of applied research in conservation is described and used as an example to show what a well-organized applied research program can produce. The same approach can also contribute to the attainment of such national goals as reducing atmospheric pollution, increasing industrial productivity, conserving scarce materials and developing renewable sources of energy. The development and improvement of electrical power generation as an example of the past role of applied research is described. Current efforts in applied research such as ceramic gas-turbine components, magnetohydrodynamic electric power generation, fluidized bed combustion, and supercritical airfoil are also described. The most significant opportunities for future successes appear to be in automotive technologies, specifically aerodynamic drag and tribology (the science of friction, lubrication and wear). The institutionalization of applied research is examined and it is noted that what is needed primarily is a mechanism for generating appropriate applied research topics. The classical function of federally supported R&D is to develop technologies whose eventual payoff is potentially high but which entails too much risk for prudent private sector investment. The chief mechanism for ensuring that the responsibilities of a national program for applied research are properly discharged is a national forum for program planning and review. Engineering societies it is noted can provide the effective institutional umbrellas for such a national forum.

Grey, J (American Institute of Aeronautics and Astronautics) Sutton, GW (AVCO Everett Research Laboratory) Zlotnick, M (Department of Energy) *Science* Vol. 200 No. 4338, Apr. 1978, pp 135-142, 3 Fig., 2 Tab., 21 Ref.

ACKNOWLEDGMENT: American Association for Advancement of Science
ORDER FROM: American Association for Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C., 20005

11 173935
U.S. ENERGY DEMAND: SOME LOW ENERGY FUTURES
The basic features of the U.S. energy supply and utilization system change slowly that an understanding of the dynamics of major change requires projections that extend several decades. Over such a time most energy-consuming capital stock is replaced, life-styles change, and technology evolves. This study of plausible low energy futures leans heavily on detailed engineering analysis of demand by sector, combined with econometric techniques where appropriate. The results indicate that, given time for the system to respond to prices, regulations, and incentives, U.S. energy demand is very elastic. Consequently, a major slowdown in demand growth can be achieved simultaneously with significant economic growth by substituting technology sophistication for energy consumption. /Author/

Science Vol. 200 No. 4338, Apr. 1978, pp 142-152, 8 Fig., 7 Tab., 19 Ref.

ACKNOWLEDGMENT: American Association for Advancement of Science

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11 174321
FUEL EFFICIENCY: NEW DIMENSION IN AIRCRAFT DESIGN
Every 1% improvement in fleet fuel economy will save 100 million gallons of aircraft fuel per year in domestic commercial aircraft alone. The author reviews the aspects of aircraft design that are expected to contribute to future advances in the technology of fuel economy. These include increased wingspan with supercritical airfoils; active control surfaces, use of advanced, lightweight composites; laminar flow control, all-wing aircraft, and liquid-hydrogen-fueled transport aircraft.

Automotive Engineering Vol. 85 No. 11, Nov. 1977, pp 40-44

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11 174323
HAVE ENERGY, WILL TRAVEL
The problem of availability of alternative aircraft fuels in the future is discussed. The effects of the following alternative strategies are examined: diversion of oil for premium transport use; new generations of low fuel-use aircraft; transference to kerosene synthesized from coal or shale; world-wide introduction of liquid hydrogen for aircraft; and some other possibilities.

Anglo-American Aeronautical Conference, 15th, London, England, 31 May-2 June 1977.

Allen, JE (Hawker Siddeley Aviation)
Royal Aeronautical Society Proceeding 1977, 31 pp, 37 Ref.

ACKNOWLEDGMENT: EI
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11 174594
COST/BENEFIT TRADEOFFS FOR REDUCING THE ENERGY CONSUMPTION OF THE COMMERCIAL AIR TRANSPORTATION SYSTEM
The fuel saving potential and cost effectiveness of numerous operational and technical options proposed for reducing the fuel consumption of the U.S. commercial airline fleet was examined and compared. The impact of the most promising fuel conserving options on fuel consumption, passenger demand, operating costs and airline profits when implemented in the U.S. domestic and international airline fleets was determined. A forecast estimate was made of the potential fuel savings achievable in the U.S. scheduled air transportation system. Specifically, the means for reducing the jet fuel consumption of the U.S. scheduled airlines in domestic and international passenger operations were investigated. A design analysis was made of two turboprop aircraft as possible fuel conserving derivatives of the DC-9-30.

Kraus, EF Vanabkoude, JC
Douglas Aircraft Company, Incorporated Summ Rpt. NASA-CR-137925, MDC-J7340, June 1976, 77 pp

Contract NAS2-8618

ACKNOWLEDGMENT: NTIS
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N78-10035/1ST

11 174598
THE LIQUID HYDROGEN OPTION FOR THE SUBSONIC TRANSPORT: A STATUS REPORT
Continued subsonic air transport design studies include the option for a liquid hydrogen fuel system as an aircraft fuel conservation measure. Elements of this option discussed include: (1) economical production of hydrogen; (2) efficient liquefaction of hydrogen; (3) materials for long service life LH2 fuel tanks; (4) insulation materials; (5) LH2 fuel service and installations at major air terminals; (6) assessment of LH2 hazards; and (7) the engineering definition of an LH2 fuel system for a large subsonic passenger air transport.

Conf-Presented at 12TH Intersoc. Energy Conversion Eng. Conf., Washington, D. C., 28 Aug.-2 Sep. 1977.

Korycinski, PF
Langley Research Center NASA-TM-74089, Sept. 1977, 28 pp

ACKNOWLEDGMENT: NTIS
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N78-10306/6ST

11 175725
TRANSPORTATION ENERGY CONSERVATION DATA BOOK: EDITION 2
Separate abstracts are prepared for the six main chapters on the various characteristics of the transportation sector. Chapter 7 provides the compilation of reference materials, and additionally, sections are devoted to a glossary, keyword index, and permuted-title index. (ERA citation 03:015114)

Shonka, DB Loebl, AS Patterson, PD
Oak Ridge National Laboratory, Department of Energy Oct. 1977, 567 pp

Contract W-7405-ENG-26

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ORNL-5320

11 176230
DESIGN OF AN APPARATUS FOR TESTING THE FLAMMABILITY OF FUEL SPRAYS
An automated small-scale test apparatus was developed for flammability testing of modified fuels. The test configuration consists of a 1/4 inch fuel delivery tube within a 1 inch air atomization pipe followed by a diffuser section. A pressurized 30 gallon air tank supplies the atomization air while a syringe pump provides a specified fuel quantity for all tests. Isentropic calculations and hot wire anemometer measurements characterize the air flow during the transient air release. Oscillograph traces specify the sequencing and timing of events. It is concluded that this transient test is a practical device for modified fuel testing because of its simple construction, well-defined operation, and capability of distinguishing between candidate additives. (Author)

Eklund, TI Neese, WE
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-78-54, FAA-NA-78-6, May 1978, 32 pp

ACKNOWLEDGMENT: NTIS
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11 176649
MAKING TURBOFAN ENGINES MORE ENERGY EFFICIENT
A review of transport aircraft gas turbine engine development and evolution during the past two decades is presented in terms of energy consumption. The interaction and effects of cycle pressure ratio, firing temperature, bypass ratio, and component efficiencies on installed fuel consumption are reviewed. The possibilities for further substantial improvement in energy efficiency with improved operating economics and with improved environmental characteristics are identified and evaluated. Parametric data are presented showing trade-offs in the areas of efficiency and economics. Environmental considerations are also discussed. The balance of these factors in a cost-effective advanced turbofan is discussed.

Hemsworth, MC (General Electric Company) Zipkin, MA
American Society of Mechanical Engineers Preprint ASME 78-GT-189, 1978, 13 pp

ACKNOWLEDGMENT: EI
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11 177420
ALTERNATE FUELS FOR FUTURE AIRCRAFT
The end of economic usefulness of conventional petroleum-base fuel for commercial transport aircraft is forecast for sometime in the 1990 decade. Commercial aviation will feel the effects of shortage first because that industry is particularly sensitive to both the cost of fuel and to the ready availability of specific fuel for which its aircraft are designed, wherever those aircraft fly throughout the world. Alternative fuels are synthetic Jet A, liquid hydrogen, and liquid methane. The results of studies comparing use of synthetic Jet A with LH2 in long-range subsonic as well as supersonic transport aircraft show significant advantages for LH2.

Proceeding of the Intersociety Energy Conversion Engineering Conference, 12th Washington, D.C., 28 August-2 September 1977. (IEEE Catalog Number 77CH12633 ENERGY.)

Brewer, GD (Lockheed California Company)
American Nuclear Society, Incorporated Proceeding Vol. 1 Paper 779009, 1977, pp 62-68, 10 Ref.

ACKNOWLEDGMENT: EI
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11 177423
AVAILABILITY OF JET FUEL OVER THE NEXT TWO DECADES
The comparative development of aviation fuels consumption in the world over the past decade is examined with particular reference to kerosene jet fuel. The degree of flexibility open to the refiner in making this product is explored. Some future consumption trends are suggested. The availability of kerosene jet fuel as a possible constraint on future demand is discussed, and speculations are made about future oil prices.

Dalton, CP *Aircraft Engineering* Vol. 49 No. 12, Dec. 1977, pp 8-14

ACKNOWLEDGMENT: EI
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11 177429
ENERGY ASPECTS OF HELICOPTERS IN COMPARISON WITH OTHER AIR AND GROUND VEHICLES
Although the total energy consumption of helicopters is small in comparison with that of other modes of transportation, energy aspects have been, and will be extremely important for the development and expansion of rotary-wing aircraft applications. Energy expenditure per passenger-mile of presently operational helicopters is compared with that of other vehicles--first, on a statistical basis and then, through a more detailed study of a very short-haul (intraurban) and short-haul (interurban-- up to 200 n. mi) operations. Possible ways of improving the energy standing of helicopters are considered in the presence of economic constraints. The presentation of a cursory procedure for minimization of the overall penalties associated with the achievement of the desired energy consumption gain concludes this study.

Stepniewski, WZ (Boeing Company) *American Helicopter Society, Journal of* Vol. 23 No. 1, Jan. 1978, pp 2-13, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 177448
ENERGY, CURRENT AND FUTURE SUPPLY AND PRICES
The importance of fuel in the overall cost structure of airlines is discussed as well as a look at the future supply of, and demand for, oil. The following topics are highlighted: Demand for primary energy; oil-the dominant energy supplier; cost of finding oil; transport of oil; oil reserves; balance of cheapness and security of supply; increase in revenue for the producer countries, response to the upsurge in oil prices; OPEC; future supply. It is concluded that the problems associated with harnessing the vast energy released by the process of fusion should be solved, provided the appropriate research effort is forthcoming. Such a break through would not only have implications for electrical supplies but could also usher in the hydrogen economy.

McFadzean, F *Chartered Institute of Transport Journal* Vol. 38 No. 3, Mar. 1978, pp 72-77, 8 Tab.

ACKNOWLEDGMENT: Chartered Institute of Transport Journal
ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

11 178461
TECHNOLOGY FOR AIRCRAFT ENERGY EFFICIENCY
The fuel consumed by U. S. commercial aviation has tripled in the past decade, primarily because of the growing use of jet aircraft with greatly improved comfort, speed, cost, and reliability as compared to earlier aircraft. Although future fuels usage is uncertain, conservative projections indicate more than doubling of the fuel required for air transportation by the year 2000. NASA formed an advisory board of representatives from industry, the airlines, other government agencies, and universities. The advisory board worked with the task force to develop a technical program plan covering those technology advances with the greatest potential for saving fuel in future air transport. The final plan was submitted to the Senate Committee on Aeronautical and Space Sciences in September 1975. The result of that planning activity was the formulation of a ten-year, multiphased program plan for the aggressive development of technology for more energy-efficient transport aircraft. Now known as the NASA Aircraft Energy Efficiency Program, six major technology programs were defined that could result in fuel savings in U. S. commercial aviation. These programs are: Propulsion--engine component improvement, energy efficient engine, and advanced turboprops. Aerodynamics--energy efficient transport, and laminar flow control. Structures--composite primary structures. This paper describes some recent results and presents NASA's plans for implementing these six programs.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Klineberg, JM (National Aeronautics and Space Administration)
American Society of Civil Engineers Proceeding 1977, pp 127-171

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 178463
ALTERNATE AIRCRAFT FUELS PROSPECTS AND OPERATIONAL IMPLICATIONS
The NASA is investigating the subject of the use of alternate fuels or aviation fuels derived from energy resources other than naturally occurring crude oil. This paper presents the results obtained thus far of investigations conducted by and for the NASA's Langley Research Center, aimed at assessing the potentials of coal-derived aviation fuels. Coal has been identified as one of the more plentiful remaining U. S. energy resources (an order magnitude greater than crude oil) and was selected as the energy source for this investigation. The fuels considered were synthetic aviation kerosene, liquid methane, and liquid hydrogen. Synthetic aviation kerosene was selected for study because the use of such a fuel is likely to cause fewer changes to the present air transportation system than would other fuels. Liquid methane and liquid hydrogen were selected for study because of their high energy content per kilogram. The Langley investigations have included the areas of fuel production, air terminal requirements for aircraft fueling, and the performance characteristics of aircraft designed to utilize alternate fuels. In the fuel production studies the energy requirements associated with the production of each of the three selected fuels have been determined, as have estimates of the fuel prices.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Witcofski, Rd (Langley Research Center)
American Society of Civil Engineers Proceeding 1977, pp 197-241, 14 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 178470
EFFECT OF CARBOXYLIC ACIDS ON OXIDABILITY OF JET FUELS [Vliyanie karbonovykh kislot na okislyaemost' reaktivnykh topliv]
The kinetics of oxidation regarding oxygen absorption and changes in the oxidation potential (OP) at the temperatures of 110-150 degree C of the following substances are studied: 1) carboxylic acids contained in jet fuels; 2) straight-run fuel T-1 from which oxygen-containing compounds have been removed; 3) hydropurified fuel T-7; 4) fuels T-1 and T-7 with appropriate additions of carboxylic acids. It is found that carboxylic acids contained in fuels are resistant to oxidation. At the temperature of 150 degree C, only 7-8% of carboxylic acids are oxidized. From monoacids they are converted to diacids. Carboxylic acids present in jet fuels as products of hydrocarbon self-oxidation (0.015%wt.), and even more so as a possible wear-resisting additive (0.003% wt.), do not have any noticeable effect on the oxidability of fuels. [Russian]

Gureev, AA (Moscow Inst of Petrochem and Gas Industries /USSR/) Chertkova, NY *Izvestiia Vysshikh Uchebnykh Zavedenii Neft'i Gaz* No. 10, 1977, pp 61-64

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 178471
INVESTIGATION OF THE EFFECT OF CYCLIC OXYGEN-ORGANIC COMPOUNDS ON WEAR-RESISTING PROPERTIES OF JET FUELS [Issledovanie vliyanieya tsiklicheskikh kislorodorganicheskikh soedinenii na protivoiznosnye svoistva reaktivnykh topliv]
Eleven derivatives of spiroundecane and dioxane are investigated as wear-resisting additives to the jet fuel TS-1. The investigation is carried out

on a laboratory setup modeling friction conditions in the rocking assembly of the control pump of an air-jet engine. It is shown that in the investigated compounds, with unchangeable cyclic base of the molecule containing oxygen atoms, the structure and place of association of hydrocarbon radicals have a considerable effect on the wear-resisting properties of a fuel. The IR-spectra of wear products testify to the differences between the mechanisms of physical and chemical processes occurring on the friction surface in the presence of different additives. The data obtained permit justification of recommendations for a directed synthesis of compounds with high wear-resisting properties. [Russian]

V Bol'shakov, GF (Military Academy of Transportation /USSR/) Belous, AR Rakhmankulov, DL *Izvestiia Vysshikh Uchebnykh Zavedenii Neft'i Gaz* No. 10, 1977, pp 65-68

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 180186
AVIATION FUEL USAGE--ECONOMY AND CONSERVATION
This paper describes some of the major short-term operational and procedural measures which may be effected by airlines to achieve optional fuel economy and conservation. These measures include the avoidance of excessive fuel uplift except when "tankering" to take advantage of price differentials between stations, the idling of unneeded engines during taxiing before takeoff and after landing, careful planning of flight profiles, the replacement of jet transports by turboprops on short-haul routes, and, finally, measures involving airspace management and air traffic control.

Craig. VF, Jr (IBI Group) Smith, BG *Canadian Aeronautics and Space Journal* Vol. 24 No. 1, Jan. 1978, pp 34-49

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

11 180537
PETROLEUM MARKET SHARES, 1978. MONTHLY REPORTS
This is one of a continuing series of reports of monitored monthly changes in the refiner sales distribution and the retail market shares of selected refined petroleum products. Estimates of volume sales and market shares are based on monthly sample surveys of refiners and independent marketers.

Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote.

Department of Energy 1978, n.p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTISUB/D/152

12 General Aviation

12 158503
UNITED STATES GENERAL AVIATION
This report presents data on general aviation cost of operations, aircraft value, fuel cost, plus fleet size and hours flown. This information is presented in historical time series and is tabulated by aircraft type and user category. The period 1959 through 1975 is covered by this report. (Author)

Aviation Data Service, Incorporated Final Rpt. FAA-AVP-76-12, July 1976, 92 pp

Contract DOT-FA76WA-3819

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A038539/3ST

12 169406
GENERAL AVIATION SELECTED REFERENCES. BIBLIOGRAPHIC LIST-CY 1976
This is a selected, partially annotated listing of periodical articles, reports, books, and pamphlets held by the Department of Transportation Library on the subject of general aviation. (Author)
See also Rept. no. FAA-AVP-76-9, AD-A035 144.

La Foy, AB
Department of Transportation DOT-OST-LIB-10, June 1977, 79 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046079/0ST

12 170833
MODEL FOR ESTIMATING THE DEMAND FOR GENERAL AVIATION
The author presents a method for measuring the quantity and price of general aviation services, which are all USA civil aircraft not legally classified as air carriers. Estimates of the price and income elasticity of demand for general aviation air services are developed. The model suggests a seventy five percent increase in demand, over ten years, if the relative price levels remain the same. The author also suggests that if the current policy of subsidising navigational and airport facilities is abolished, it would reduce the current pressure to expand these subsidised facilities.

Ratchford, B (New York State University) *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 193-203, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: ESL

12 170848
PLAN FOR GENERAL AVIATION AIRFIELDS [Flyvepladser for den mindre flyvning]
The report investigates the number, distribution, capacity, facility and environmental problems of the present and future general aviation airfields in Denmark. The plan is to be used according to the New Country and Regional Planning Act. The plan is based on a doubling of the number of aircraft and aircraft operations in the next 10 years period. Today the number of small aircraft registered is 700, and 75 percent of the traffic with these aircraft is private and training traffic. The number of airfields today is about 110, with some noise problems. Better statistical informations are needed. Free right to establish new private airfields should be abandonned in the legislation. [Danish]

Trafikministeriet Oct. 1975, n.p.

ACKNOWLEDGMENT: European Conference of Ministers of Transport

12 172705
TURBINE TAXI
The operations of executive jet air transportation companies are described. In these generally small scale services, flexibility of personnel is paramount, as often one individual will be called upon to perform a variety of tasks. A radar tracking technique is described that permits the pilot to monitor drift from his course. The technique is particularly useful on long sea crossings.

Williams, N (Jet Center Limited) *Shell Aviation News* No. 440, 1977, pp 14-19

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

12 172919
PERENNIAL QUESTION: RENT OR BUY?--A CALCULATED LOOK AT THE ECONOMIES ON BOTH SIDES
This article describes the different costs associated with buying or renting an airplane. The choice will ultimately depend on the specifics of one's own particular situation with respect to local aircraft rentals, hangar and fuel costs and on the amount of time one plans to fly. Ownership costs are divided into fixed and variable costs. Fixed costs include parking costs, insurance and annual inspection. Variable costs are those directly relating to the number of flight hours such as gasoline and oil costs, and depreciation. The buy/rent problem is examined by comparing the total cost of a two/four place aircraft with the hourly cost of a two/four place aircraft. It is noted, however, that the decision to buy/rent is not an exclusively clear cut decision. There are many intangible factors such as the "pride of possession" concept; safety factors associated with one's familiarity of an aircraft; minimum daily rental costs for extended trips; fixed expense of ownership; and cost of compliance with mandatory airworthiness directives.

Eckalbar, W Eckalbar, J *Private Pilot* Vol. 13 No. 2, Feb. 1978, pp 22-25, 3 Fig., 2 Tab., 1 Phot.

ACKNOWLEDGMENT: Private Pilot
ORDER FROM: Marco-Comm Corporation, 8322 Beverly Boulevard, Los Angeles, California, 90048

12 173690
A STUDY OF GENERAL AVIATION IN THE SOUTH EAST OF ENGLAND
The purpose of this study was to collect facts concerning general aviation (GA) in the South East, to present forecasts of potential demand arising within the study area in the period 1985, and to review these forecasts in the light of volume and type of ground facilities available to general aviation users. The report analyses the demand for GA facilities, the rational of recreational and business flying, the need of the user, the available facilites, and future propects. The report indicates that both exclusive business and air taxi operations are likely to continue to grow; fuel price increases are not expected to have a major effect on this particular type of flying; and, some growth is forecast for third level services and other fixed wing GA operations. It is noted that although the requirements of the different users vary considerably, there is still a shared use of certain facilities. Finally a comparison is made between the magnitude of precast demand and the size and capacity in aviation terms of the 67 airfields classified is this report showing which airfield, could in principle accept the different classes of traffic.

Standing Conf on London and SE Regional Planning Nov. 1974, 85 pp, Tabs., Apps.

ACKNOWLEDGMENT: Standing Conf on London and SE Regional Planning
ORDER FROM: Standing Conf on London and SE Regional Planning, 26 Old Queen Street, London SW1H 9HP, England

12 173708
GENERAL AVIATION AIRCRAFT 1978
All general aircraft currently available or expected to be marketed and/or certificated in the United States during 1978 are listed by type (piston single engine fixed gear, piston single engine retractable gear, piston multi-engine, turboprops, turbojets, STOL, AG planes, rotary wing, sallplanes, and ballons) and, within each type, by manufacturer, along with their specifications and prices.

AOPA Pilot Vol. 21 No. 3, Mar. 1978, pp 57-77

ACKNOWLEDGMENT: AOPA Pilot
ORDER FROM: Aircraft Owners and Pilots Association, 7315 Wisconsin Avenue, Washington, D.C., 20014

12 173826
YOU AND AVIATION, A HANDY GUIDE FOR FOREST SERVICE PEOPLE WHO USE AVIATION SERVICES
No Abstract.

Forest Service, Department of Agriculture 1976, 15 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

A13.36/2:Y8

12 173835
NASA TECHNICAL RESEARCH: CURRENT DEVELOPMENTS IN THE GENERAL AVIATION FIELD
In 1973 NASA set up the General Aviation Technology Office, a special bureau whose mission was to undertake research in the general aviation field in order to keep future design technology at the highest possible level. The Agency is investigating areas that relate to practically all the problems of contemporary design, whether in the areas of safety, environmental protection or performance improvement. During the past year, NASA research endeavours have involved investigation of advanced airfoils, integrated avionics systems and procedures for obtaining significant fuel economy. This article specifically covers NASA's effort in the field of stall/spin recovery techniques, light aircraft crashworthiness, new airofoil development, propulsion avionics, environmental protection cross-wind landings, and research on rotor blades.

Interavia Vol. 33 Jan. 1978, pp 63-65, Phots.

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

12 173836
NEW MODELS FOR NEW MARKETS, U.S. GENERAL AVIATION AT A TURNING POINT
This article describes new trends and developments in the U.S. general aviation market. The intent of the major manufacturers is to offer an even greater choice of models in order to satisfy the demands of a maximum number of operators. It is noted, however, that 1978 models show particular development in three sectors: Light bottom-of-the-range twins, twin turboprops, and long-range jets. A recent study on prospects for U.S. general aviation through 1982, shows that twin turboprop utilization will increase significantly. It is also noted that the essential aims of business jet manufacturers will be to develop aircraft that are truly intercontinental or transoceanic in range, powered by fuel-efficient engines and incorporating aerodynamic refinements such as winglets, supercritical wing profiles or area-ruled fuselages. The leasing models for 1978 from the following U.S. manufacturers are described: Beech Aircraft Corporation, Cessna, Gates Learjet, Piper and Rockwell International.

Grangier, M *Interavia* Vol. 33 Feb. 1978, pp 103-107, Phots.

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

12 174011
1978 PLANNING AND PURCHASING HANDBOOK
1978 aviation forecast with respect to fuel supply, environment, financing-/leasing, taxation, insurance, and proposed rules are presented. Forecasts indicate adequate fuel availability for five years, although some spot shortages will continue. Availability of fuels, it is noted, would be enhanced if federal pricing and allocation controls on them were removed. International conflict and labor strikes can also affect aviation fuel supplies. Noise reduction efforts are identified as the single most important environment issue facing the jet aircraft industry. The lack of any national standard relating to noise abatement have only compounded the problem. Approximately 80% of all operators are now making outright acquisitions of equipment as opposed to leasing. The reason is that the company jet is still worth about 80% of the original price in residual value after seven or eight years. President Carter's proposed tax program which would make the 10% investment tax credit permanent would permit companies to offset up to 90% of their tax liabilities in any one year through investment tax credits. A 10% ITC would encourage investment, as well as assist businesses in making long-range capitol investment decisions. Insurance underwriting have, the for the most part, increased because of the over capacity of markets. The cost of liability insurance continues to be a bargain compared to the cost of hull coverage. General operations have accounted for the bulk of the voices of proposed rulemaking coming from FAA and other agencies. Regulatory proposals, relating to noise, operations, aircraft, and commuters/air taxis are included as well as probable rules in the future.

Business and Commercial Aviation Magazine Vol. 42 No. 4, Apr. 1978, pp 13-50, Phots.

ACKNOWLEDGMENT: Ziff-Davis Publishing Company
ORDER FROM: Ziff-Davis Publishing Company, 1 Park Avenue, New York, New York, 10016

12 174311
ANGLO-AMERICAN AERONAUTICAL CONFERENCE, 15TH, 1977
Proceedings includes 22 papers covering, in particular, the following topics: progess in civil transport aviation; contribution of general aviation to human welfare and industrial development; the future of helicopters in aviation; avaiation activities in global perspective; aircraft noise and other types of pollution; the land use problem in the airport environment; future availability of aircraft fuels; aviation's impact on business; tour operating and its implications for air transport; sporting flying; search and rescue in the Canadian forces; the value of commercial air transportation to the economy; basic safety concepts; road, rail, and air competition; the role and future for air freight; North American passenger and freight transportation--air vs. ground; constraints and opportunities of aviation in the future; and the major technical possibilities for advancements in aviation.

Anglo-American Aeronautical Conference, 15th, London, England, 31 May-2 June 1977.

Royal Aeronautical Society Proceeding 1977, v.p.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

12 175018
AGRICULTURAL AVIATION RESEARCH
A compilation of papers, comments, and results is provided during a workshop session. The purpose of the workshop was to review and evaluate the current state of the art of agricultural aviation, to identify and rank potentially productive short and long range research and development areas, and to strengthen communications between research scientists and engineers involved in agricultural research. Approximately 71 individuals actively engaged in agricultural aviation research were invited to participate in the workshop. These were persons familiar with problems related to agricultural aviation and processing expertise which are of value for identifying and proposing beneficial research.

Conf-Proc. Of Workshop Held at College Station, Tex., 19-21 Oct. 1976.

Chevalier, HL Bouse, LF
Texas A&M University NASA-CP-2025, 1977, 151 pp

Contract NASA ORDER L-49862-A

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-12999/6ST

12 176612
TERMINAL BUILDINGS FOR GENERAL AVIATION AIRPORTS
Chandler (Arizona) Municipal Airport is a general aviation airport. Its administration building is considered inadequate to meet existing and future needs, therefore this study determines the present and future needs for a terminal building and a structure is presented to satisfy those needs. The principles used in this case study are applicable to other airports. The design is primarily one of space utilization, taking advantage of aeronautical experience and the airport management's knowledge of the specific requirements of the airport. A list of characteristics was compiled that was felt should exist in the terminal facility. These include a waiting area, coffee shop/dining area, flight planning room pilot's lounge, airport management area, restrooms, and parking. Approximately 12.3 acres have been designated for the site of the future terminal facility. The criteria used for designing the terminal include an understanding of the airports past, present and future; pedestrian and automobile traffic flow principles; the geographical area involved; and, various design features acquired through personal observation and aviation experience. Finally, it is noted that airport management must be extensively involved with the design of the terminal building, and general aviation terminal buildings can effectively incorporate principles now used primarily in air carrier terminal facilities.

Linquist, W *Airport Management Journal* Vol. 2 No. 3, Oct. 1977, pp 2-4

ACKNOWLEDGMENT: Airport Management Journal
ORDER FROM: American Association of Airport Executives, 2029 K Street, NW, Washington, D.C., 20006

12 176744
GENERAL AVIATION IN WEST GERMANY: A UNIQUE SITUATION IN EUROPE
This article presents an overview of the general aviation in West Germany and is divided into three problem areas relating to airspace restrictions, the

obtaining of pilots' licences and supplementary ratings, and the awarding of certificates of air worthiness for foreign aircraft and equipment. Factors such as Germany's geography, its boundaries, its eleven international airports, the host country for the Air Forces of eight NATO countries, numerous flight training missions over West Germany, glider pilots and airfields, and airlines and helicopters, are cited as the main reasons for West Germany's crowded airspace. The solution to safe light aircraft quotients is to avoid the airspace between 150 and 1500 m. Because of the number of "near-miss" accidents, requirements have been raised for the granting of pilot's licences and ratings. As a result standards have gone up, the cost of obtaining a licence has gone up, and the number of licensed pilots has grown at a slower rate than in previous years. The certification of aircraft and equipment is a prime factor in the worsening situation of general aviation in West Germany. The additional cost of obtaining a type of certification for foreign-built equipment is reflected in the aircraft's price.

Grangier, M *Interavia* Vol. 33 Apr. 1978, pp 331-333

ACKNOWLEDGMENT: Interavia
ORDER FROM: Interavia, 86 Avenue Louis Casai, 1216 Cointrin-Geneva, Switzerland

12 179829
HELICOPTER APPLICATIONS ARE STEADILY EXPANDING
This article discusses the growing number of civil helicopters operating in the United States and Canada and their equally growing application. In the operator market, fleet units are accelerating their growth, operators are upgrading to newer and more productive models, and aggressively promoting new applications in the areas of logging, heavy construction, and agriculture. It is noted that the four biggest factors in owned aircraft in the corporate market are construction and real-estate companies, forestry and distribution industries. Small to medium-size companies continue to provide the largest potential for single-engine helicopters. The petroleum industry and the sub-seas production systems in the future promise to extend the range required for helicopters. Pipeline construction also continues to provide a market for the helicopter industry. Another application is using the helicopter to leap frog the congested ports and provide uninterrupted deliveries. The Bell 222 gives some indication of the design trends over the next few years. The 222 has crashworthy fuel cells and breakaway fittings; each seat has six inches of energy absorption material; inside each of the rotor blades is a glass fiber strap; the fin is sized on the tail; dual hydraulics and dual systems throughout; low interior cabin noise; and, easy access to the engine and transmission.

Jose, DK (Bell Helicopter Textron) *ICAO Bulletin* Vol. 32 No. 9, Sept. 1977, p 33

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

13 142482
TRANSPORT RESEARCH AND ITS ROLE
It is now widely recognized that technical and scientific advice and information is required to help in the formulation and development of transport policies and in their effective implementation. This is true for particular transport modes-road, rail, air and sea-and also for broader questions of transport planning and information. In almost all transport problems, social and environmental aspects are growing in importance; narrow technical solutions and even a broader techno-economic approach are seldom adequate. This reflects changing public attitudes and priorities, and today the information required to aid central and local government transport policies should include consideration of many critical social factors which are difficult to gauge in generally acceptable objective terms. An attempt to do so is an essential element in transport research and increasingly influences the activities of those engaged in such work. The paper outlines ways in which transport research laboratories and similar organizations are tackling this task, and illustrates them by examples drawn from work on infrastructure and vehicles, traffic and safety, and systems and operations. It also includes some comments on the organization of transport research. /Author/ /TRRL/

Silverleaf, A
Transport and Road Research Laboratory Supplement TRRL-SR-215UC, 1976, 8 pp, 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 221991)
ORDER FROM: TRRL

13 144336
TRANSPORTATION POLICY PRIORITIES IN NEW BRUNSWICK
This paper summarizes the activities in some of the transportation policy areas in an attempt to convey a prospective of current transportation priorities in New Brunswick. The author reviews the areas of Urban Transit, Air Passenger Services, Water Mode and Freight Subsidies.

This paper was published as part of the Proceeding of the 1975 Annual Conference held in Calgary.

MacIntosh, RD (New Brunswick Department of Economic Growth)
Roads and Transportation Association of Canada Proceeding 1976, pp 319-324

ACKNOWLEDGMENT: Roads and Transportation Association of Canada
ORDER FROM: Roads and Transportation Association of Canada, 1765 St Laurent Boulevard, Ottawa, Ontario K1G 3V4, Canada

13 147680
NATIONAL TRANSPORTATION TRENDS AND CHOICES TO THE YEAR 2000
A projection of the form and direction that the U.S. transportation system will take over the next 25 years has been made as a foundation for the development of a national transportation policy, but the report is not itself written as a plan of action. Detailed are the choices faced by Americans in dealing with their dominant taxpayer-financed highway system. Transport modes are working at cross purposes, in terms of a healthy economy and of survival of the cities. Airlines and railroads face money shortages needed to maintain existing facilities and to expand. No decline is seen in demands for transport services for the remainder of the century and this will impose additional costs on society. Petroleum products account for more than 95 per cent of energy used to operate transportation and transportation accounts for more than half the annual petroleum consumption. Planning efforts may have to be redirected because of petroleum shortages, even with development of more costly substitute liquid fuels. Among the questions raised: How should a democratic society allocate current resources between today's needs and long-term problems? When should the public intervene in free-enterprise marketplace decisions? How can government best institute orderly procedures to make necessary changes in public policy, given the near-term impact on persons and institutions?

A special supplement of Transportation Systems Maps accompanying the report is also available.

Coleman, WT, Jr
Office of the Secretary of Transportation Jan. 1977, 412 pp

ORDER FROM: GPO

13 147857
SOME POLICY IMPLICATIONS OF SUBJECTIVE FACTORS IN THE MODAL CHOICE FOR FREIGHT MOVEMENTS
The Australian constitution gives the Australian government control for overseas transport, for transportation, from and within the territories and for interstate transport. Regulation of transportation within the state boundaries is the responsibility of the individual states. This control has, so far, only been exercised for sea and air movements, but recently, the government has commenced to extend its right to regulate instate freight movements to road and rail. Freight traffic between Melbourne and Sydney is of particular interest in the development of the national highway system, and is described as being 63.8 per cent by road, 22.7 per cent by rail, 13.2 per cent by sea and 0.3 per cent by air. This article describes a study which analyses the processes a sample of distribution managers and transportation managers perform when making the modal choice for freight movements between the two cities. The aim of the study was to establish the factors which were important in the modal choice for this traffic so that, with the help of this information, policy could be established for the development of the road link between Melbourne and Sydney. /TRRL/

Gilmour, P (Monash University, Australia) *Logistics and Transportation Review* Vol. 12 No. 1, 1976, pp 39-57, 1 Fig., 7 Tab., 24 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-223271)
ORDER FROM: British Columbia University, Faculty of Commerce, Vancouver 8, British Columbia, Canada

13 149437
THE SITUATION WITH AIR TRANSPORT. ITS POSITION AND RELATIONS WITH REGARD TO SURFACE TRANSPORT
Brief summary of air transport developments over the last fifteen years; according to the author air transport is getting its second wind. With regard to the technical and commercial renovation of surface transport, he analyses the situation under three aspects: competition, complementarity and coordination.

Mercier, J *Rail International* Vol. 7 No. 12, Dec. 1976, pp 673-677

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: ESL

13 154952
COST BENEFIT ANALYSIS AND THE NATIONAL AVIATION SYSTEM-A GUIDE
This manual contains a discussion of cost-benefit methodology as it applies to the national aviation system, an explanation of selected values for potential use in Federal Aviation Administration studies, and the principles, concepts, and techniques appropriate to estimating benefits and life-cycle cost. In addition, parameters useful for valuing changes in capacity, delay, and aviation safety are presented. (Author)

Noah, JW Groemping, RA Berterman, JE Greynolds, OL
Noah (J Watson) and Associates Final Rpt. FAA-AVP-77-15, Feb. 1977, 232 pp

Contract DOT-FA76WA-3769

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A037434/8ST

13 155435
AN ANALYSIS OF U.S. AIR CARRIER DOMESTIC ROUTE AUTHORITY
A number of proposals are before Congress regarding the reform of Civil Aeronautics Board economic regulation of the air service industry. Most of these proposals contain provisions referring to the removal of at least some restrictions on existing carrier certificate authorities. This study provides the first comprehensive listing of each carrier's authority on a city pair basis. For each city pair where a carrier holds authority to provide service, the report indicates whether or not service is being provided and if so, whether or not the level of service provided is equal to the highest level of service authorized (e.g., single plane, multi-stop, single stop, or non stop). Finally, a summary is provided of service available from a given air carrier to each city on its route as compared to authorized service.

Simat, Helliesen and Eichner, Incorporated, Department of Transportation
Final Rpt. DOT/TPI/70-77-13, Mar. 1976, 158 pp

Contract DOT-OS-40123

ACKNOWLEDGMENT: NTIS
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PB-267360/6ST

13 156134
A MASTER PLAN FOR TRANSPORTATION
The results are presented of an evaluation of the State's needs on those transportation systems for which the New Jersey Department of Transportation is responsible. The plan encompasses various travel modes, outlines the needs of each mode to serve travel demand through 1990 and recommends specific movements for highways, railroad and bus operations, and airports. Present day travel as well as future trends were analyzed and an effort has been made to place transportation policy in a historical perspective, to incorporate new concepts, and to employ accepted principles of transportation planning. Attempt has been made to reflect statewide concerns and to truly represent statewide needs. The data for this report was obtained through review of the results of the recent National Transportation Needs Study.

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

New Jersey Department of Transportation 1972, 61 pp, Figs., Phots.

ORDER FROM: New Jersey Department of Transportation, 1035 Parkway Avenue, Trenton, New Jersey, 08625

13 156150
THE TOTAL TRANSPORTATION PLAN FOR THE NORTH CENTRAL TEXAS REGION FOR 1990
This study describes the Total Transportation Plan for the North Central Region for 1990: The region's first multimodal transportation plan. This plan was developed based on socieconomic projects, anticipated travel patterns and characteristics, and utilization of proposed facilities. The plan explores the impacts of all ground transportation systems on economics and land use, natural resources and the environment, and accessibility to employment opportunities as well as many features of the transportation system itself. A total of six alternative ground transportation systems were explored and evaluated, as well as four alternative airport system concepts evaluated for inclusion in the Total Transportation Plan. The recommendations for airports, highways and transit facilities represent the policy direction most favorable for the region in terms of social, environmental, and economic impacts.

The preparation of this report was assisted by the Regional Planning Office of the Texas State Department of Highways.

North Central Texas Council of Governments 1974, 170 pp, 69 Fig., 25 Tab., 2 App.

13 157877
CHARACTERIZATION OF THE U.S. TRANSPORTATION SYSTEM: DOMESTIC AIR TRANSPORTATION (PASSENGERS AND CARGO), HIGHWAY TRANSPORTATION (AUTOS, TRUCKS, BUSES, MOTORCYCLES, BICYCLES), PIPELINE TRANSPORTATION SYSTEMS (PETROLEUM, NATURAL GAS, WATER), RAILROADS (FREIGHT AND PASSENGER), URBAN RAIL TRANSIT, AND WATER TRANSPORTATION OF FREIGHT
These internal working papers provide data on the physical state, use, economics, and energy consumption and intensity of the U.S. transportation system, including these modes of transportation: air transportation, highway transportation, pipeline transportation, railroads, urban rail transit, and water transportation.

Aerospace Corporation July 1976, 487 pp, 71 Ref.

ACKNOWLEDGMENT: Transportation Energy Conservation Data Book
ORDER FROM: NTIS, GPO

13 164932
METRICATION AND STANDARDIZATION IN THE AEROSPACE INDUSTRY
Metric standards are required by the aerospace industry to ensure a cost-effective transition from our customary units of measurement. A well-coordinated and-managed effort is required to eliminate any duplication of effort and to ensure that all required standards are created. The standards which are required, the estimated cost of the effort, the organizations involved in the preparation and coordination are discussed. The benefits to be derived from coordinated metric standards along with some of the accomplishments are also covered.

SME Tech Pap Ser IQ 1976, Westec Conf, Los Angeles, California. Zelenka, WR (Lockheed Aircraft Corporation)
Society of Manufacturing Engineers SME-IQ76-178, 1976, 19 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

13 165954
ANNUAL REPORT OF OPERATIONS UNDER THE AIRPORT AND AIRWAY DEVELOPMENT ACT (7TH) OF 1970 AS AMENDED BY THE AIRPORT AND AIRWAY DEVELOPMENT ACT AMENDMENTS OF 1976
With the enactment of the Airport and Airway Development Act of 1970 the nation moved toward achieving an efficient and safe airport and airways system. Reflecting the role of aviation in the economy and the public benefit derived from safe and efficient operation, that statute (1) found the airport and airway system inadequate to meet the requirements of the then current and projected growth in aviation, (2) declared substantial expansion and improvement was required to meet the demands of interstate commerce, the postal service, and national defense, and (3) established an expanded program of federal matching grants to sponsors of airports serving commercial and general aviation. Moreover, the Act established a system of user taxes paid into a trust fund to provide an assured, long-term source of funding. Section 24 of the Airport and Airway Development Act requires that the Secretary, Department of Transportation, submit an annual report to Congress of operations under Part II of the Act for the preceeding fiscal year. This report covers operation for the fiscal year ending June 30, 1976 and e Transition Quarter ending September 30, 1976.

See also AD-A019 153.

Federal Aviation Administration 1976, 103 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040167/9ST

13 166697
REPORT OF COMMITTEE TO REVIEW THE AERONAUTICS COMMISSION PERFORMANCE AUDIT
In May 1974, following a report of the findings of the Aeronautics Commission performance audit, the Indiana Legislative Council appointed a special committee to perform further evaluation and follow-up of the audit recommendations. This was one of the first committees to review the findings and recommendations of a performance audit of a state government agency. The Committee had observations, reported here, which may be pertinent to future committees assigned to review performance audits.

Indiana Legislative Council Nov. 1974, 12 pp

ACKNOWLEDGMENT: NTIS
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PB-268727/5ST

13 166741
PROGRAM MEMORANDUM: TRANSPORTATION FACILITIES
The overall objective of the Transportation program is to facilitate the rapid, safe, and economical movement of people, and goods, into, within, and out of the state by providing and operating transportation facilities and supporting services. The Transportation program is composed of four principal sub-programs: Air Transportation Facilities and Services, Water Transportation Facilities and Services, Land Transportation Facilities and Services, and Overall Program Support for Transportation Facilities and Services.

Submitted to the 59th State Legislature of Hawaii.

Hawaii. State Legislature Jan. 1977, 25 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-269432/1ST

13 167005
AN OVERVIEW OF FAA ACTIVITIES IN CIVIL AVIATION METRICATION
An overview of FAA involvement in civil aviation metrication activities is presented. The problems associated with conversion of the National Airspace System are summarized. A system analysis effort is proposed to obtain a better understanding of metric conversion impact and to forecast risk factor(s) in order not to compromise safety. An engineering and

development program is outlined to serve as a stimulant to initiate or provoke further thinking in describing what needs to be done. (Author)

Yulo, C
Federal Aviation Administration Final Rpt. FAA/RD-77/95, Aug. 1977, 17 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043473/8ST

13 167033
DEPARTMENT OF TRANSPORTATION BUDGET PROGRAM: ANALYSIS OF FISCAL YEAR 1978 DOT PROGRAM BY POLICY AND RD AND D MANAGEMENT OBJECTIVES. PROGRAM LEVELS FOR FISCAL YEARS 1976, 1977, 1978

The document presents a synopsis of the total budget program of the Department of Transportation (DOT) and summarizes the Research, Development and Demonstration (RD&D) and Grant Programs in terms of DOT Policy and RD&D Management Objectives and other classification structures. The program information is presented for three fiscal years, 1976 through 1978, including the 1976-1977 transition quarter. Its objective is to facilitate communication between the various elements of DOT and other sectors of transportation, both public and private, so as to obtain more benefits to the Nation from the investments being made in transportation research.

See also PB-255 402.

Paullin, RL Dye, I Bolger, PH
Office of the Secretary of Transportation Final Rpt. DOT-OST-77-1, June 1977, 455 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-270676/0ST

13 167048
TRANSPORTATION INVESTMENT REQUIREMENTS AND GROWTH PATTERNS IN MICHIGAN

The purpose of the research was to develop a transportation supply-demand model for use in statewide transportation planning in Michigan. This model was to be utilized to determine the transportation investments required to attain certain levels of transportation services for alternative demographic growth patterns for the state.

Taylor, WC McKelvey, FX Berridge, D Carrick, JT Witkowski, JM
Michigan State University, East Lansing, Department of Transportation Final Rpt. DOT-TST-77/49, May 1977, 268 pp

Contract DOT-OS-50044

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-270974/9ST

13 167090
REGULATORY REFORM AND THE FEDERAL AVIATION ACT OF 1975. REPORT OF THE WORKSHOP ON NATIONAL TRANSPORTATION PROBLEMS (5TH), FEBRUARY 29 AND MARCH 1, 1976. PROGRAM OF UNIVERSITY RESEARCH

The workshop is one of a continuing series to develop information useful to the Department of Transportation policymakers through interaction of university faculty members, industrial representatives and Government officials in a conference setting. Four panels considered the following questions: How well does the Federal Aviation Act of 1958 serve the needs of the public; How will the market function under the price, entry and exit flexibility provisions of the proposed Federal Aviation Act of 1975; What will be the impact on service to small communities and on subsidies of the changes proposed by the Federal Aviation Act of 1975; What are the financial implications of regulatory change.

Moses, LN
Office of the Secretary of Transportation Final Rpt. DOT-TST-76-59, 1976, 214 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-271449/1ST

13 168768
WHY THE FEDERAL AIRLINE SUBSIDY PROGRAM NEEDS REVISION: CIVIL AERONAUTICS BOARD

The report discusses the need for the Congress to provide the Civil Aeronautics Board with a legislative mandate to restruvture the airline subsidy program to insure necessary air services to small communities at the least cost to the Federal Government and identifies ways program effectiveness can be improved.

Report to the Congress.

General Accounting Office CED-77-114, Aug. 1977, 40 pp

ACKNOWLEDGMENT: NTIS
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PB-271238/8ST

13 168776
CATASTROPHIC EVENTS LEADING TO DE FACTO LIMITS ON LIABILITY

This study conducts an overview of large technological systems in society to ascertain prevalence, if any, of situations that can lead to catastrophic effects where the resultant liabilities far exceed the insurances or assets subject to suit in court, thereby imposing de facto limits on liability. Several potential situations are examined: dam rupture, aircraft crash into a sports stadium, chemical plant accident, shipping disaster, and a toxic drug disaster. All of these events are estimated to have probabilities per year similar to or larger than a major nuclear accident and they are found to involve potential liability far exceeding the available resources, such as insurance, corporation assets, or government revenues.

See also PB-261 842.

Solomon, KA Okrent, D
California University, Los Angeles, National Science Foundation UCLA-ENG-7732, NSF/RA-770131, May 1977, 37 pp

Grant NSF-OEP75-20318

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-271427/7ST

13 168778
FEDERAL NOISE PROGRAM REPORT SERIES. VOLUME I. DEPARTMENT OF DEFENSE: AIR INSTALLATIONS COMPATIBLE USE ZONES (AICUZ) PROGRAM

This document is intended to assist Federal agencies in understanding the Department of Defense's program to abate noise at military airfields. It covers some of the important features of the Air Installations Compatible Use Zones (AICUZ) Program, its problems and relationships to other agency noise programs.

Environmental Protection Agency EPA/550/9-77/353, Apr. 1977, 91 pp

ACKNOWLEDGMENT: NTIS
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PB-271441/8ST

13 168807
ANALYSIS OF THE INCREMENTAL COST AND TRADE-OFFS BETWEEN ENERGY EFFICIENCY AND PHYSICAL DISTRIBUTION EFFECTIVENESS IN INTERCITY FREIGHT MARKETS

The report describes a study of the effects of changes in national transportation policy on the traffic allocation and the energy consumption of various modes of intercity freight transportation. Models have been developed to predict the level of service associated with the transport alternatives available to a firm, to predict the total logistics cost of each of these alternatives, and to forecast the demand for various modal services at the disaggregate level. Using these models and methods, it is possible to make detailed forecasts of commodity flows under alternative policy options. Policy options selected for analysis were investigated with a computerized model system which simulated freight flows between four pairs of major metropolitan areas. Before the model could be applied, each policy was analyzed with regard to its effect on the key level of service determinants. The model system was then used to predict the impact of the level of service changes on the shipping patterns of a sample of individual firms. These results have been summed and expanded to produce aggregate forecasts of modal shares and energy consumption.

Roberts, PO
Massachusetts Institute of Technology, Department of Energy, (FEA-50154) FEA/D-77/375, Nov. 1976, 186 pp

Contract FEA-CO-04-50154-00

ACKNOWLEDGMENT: NTIS
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PB-271792/4ST

13 168820
THE CONCORDE--RESULTS OF A SUPERSONIC AIRCRAFT'S ENTRY INTO THE UNITED STATES
The Federal Aviation Administration conducted surveys of public opinion during the Concorde trial period at Dulles International Airport to determine community reaction. GAO believes the information obtained from these surveys is unreliable and should not be used in the formulation of policy towards the Concorde. Noise complaints received indicate a negative Concorde response. Although GAO's review dealt only with the Concorde's noise aspects, decisions affecting this aircraft are considered to have important implications for the U.S. economy and U.S. international relations.

General Accounting Office CED-77-131, Sept. 1977, 46 pp

ACKNOWLEDGMENT: NTIS
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PB-272006/8ST

13 169200
CALIFORNIA TRANSPORTATION PLAN-RECOMMENDED STATEWIDE TRANSPORTATION GOALS, POLICIES AND OBJECTIVES
The report is the policy element of the California Transportation Plan. It represents the transportation goals, policies and objectives and is one of six elements of a full state transportation plan. The policy element contains six chapters. Chapters I through IV deal with basic principles and policies to be used in transportation decision-making. The final two chapters are concerned with applications and implementations of policies.

Prepared by California Transportation Plan Task Force, Sacramento. Sponsored in part by Transportation Systems Center, Cambridge, Mass.

California State Transportation Board, Transportation Systems Center DOT-TSC-OST-77-65, Mar. 1977, 251 pp

ACKNOWLEDGMENT: NTIS
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PB-274341/7ST

13 169621
GOVERNMENT-INDUSTRY COST-SHARED CONTRACTS
Government-industry cost-sharing is defined as basic research, applied research, and development projects in which the costs and efforts are shared by both parties (not necessarily equally) through specific contractual arrangements. Potentially, it is a powerful tool both for the development and the diffusion of new technology. The purpose of the study was to find, identify, and describe all of the government-industry cost-shared basic research, applied research, and development contracts for the five fiscal years of 1969 through 1973 in the six Departments of Agriculture, Commerce, HEW, Interior, Labor, and Transportation. After the contracts were found and identified, interviews were conducted with the government Contracting Officer and the Contracting Officer's Technical Representative for each of the contracts to determine the origin and status of the government-industry relationship, the objective of the contract, the nature of the technical problem, and the results of the contractual effort. Finally, interviews were conducted with a selected sample of the industry cosponsors to obtain indications of industry's use of the results and industry's view of the efficacy of cost-sharing as an incentive to technological innovation.

Manalytics, Incorporated, National Science Foundation NSF/RA/R-75/032, July 1975, 100 pp

Contract NSF-C-890

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-273010/9ST

13 170828
AIR TRANSPORT: A CASE STUDY IN INTERNATIONAL REGULATION
After reviewing the present regulations relating to scheduled air services such as bilateral agreements between states, airlines or IATA and their economic consequences and of non-scheduled services it is suggested that the latter should be freed from artificial conditions and be included in bilateral agreements with a limit to total capacity but no control of tariffs. It is also recommended that IATA tariff conferences should be required to publish the economic justification for fares.

Doganis, R *Journal of Transport Economics and Policy* Vol. 7 No. 2, May 1973, pp 109-133, Tabs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England

13 170857
THE PLANNING OF AN AIRPORT SYSTEM. A COMPREHENSIVE APPROACH
This paper claims to be comprehensive in the following two ways: 1. by including in the consideration, apart from the airport capacity proper, also the consequences in other sectors of society besides the air traffic sector; and 2. by paying attention to decision-making procedures and consultation structures (including government bodies, trade and industry, research institutions), which ought to be taken into account in arriving at similar decisions.

Direct requests to C. Berkowitz.

Van der Kind, R
World Conference on Transport Research Apr. 1977

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: MAUDEP, P.O. Box 722, Church Street Station, New York, New York, 10008

13 172426
EVALUATING OPTIONS IN STATEWIDE TRANSPORTATION PLANNING/PROGRAMMING--ISSUES, TECHNIQUES, AND THEIR RELATIONSHIPS
This report summarizes the key issues facing state planners, identifies impacts resulting from alternative solutions to the issues, describes available techniques to measure impacts, and reports data availability to apply the selected techniques. A list of approximately 75 specific issues were sorted in 11 major areas within which states must make key transportation decisions: revenue shortfall; development and multimodal transportation policies, plans and programs; organization and management; coordination with other state and regional programs; development of energy policy, plan and program; relationship between transportation improvements and developments; major corridor improvements; cost-effectiveness in highway standards and maintenance; improvement/abandonment of rail service, funding transit services and improvement; airport capital improvement. Information most relevant in addressing these issues was grouped in seven fields of impact: environmental, social economic, travel, development, legal/administrative/institutional/financial, plan and program evaluation. These same fields were used to classify the techniques.

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with Federal Highway Administration.

Bellomo, SJ Mehra, JJ (Planning Environment International) Stowers, JR Cohen, HS Petersilia, MR Rena, AT (System Design Concepts, Incorporated) *NCHRP Report* No. 179, 1977, 91 pp, 3 Fig., 20 Tab., 5 App.

ORDER FROM: TRB Publications Off

13 173501
TRANSPORT BIBLIOGRAPHY-CONTROL AND ORGANISATION OF TRANSPORT
The bibliography contains references on the history and development of transport industry policy, management and organization. References are included on air, rail, road and marine transport modes.

Chartered Institute of Transport Monograph Dec. 1975, 35 pp

ACKNOWLEDGMENT: TRRL (IRRD 224398)
ORDER FROM: Chartered Institute of Transport, 80 Portland Place, London W1N 4DP, England

13 173825
AIR FORCE CONTINGENCY PLANS SHOULD INCLUDE FACILITIES OF CIVIL RESERVE AIR FLEET
No Abstract.

A report to the U.S. Senate Committee on Appropriations.

General Accounting Office LCD-77-207, Apr. 1977, 35 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

GA1.13:LCD-77-207

13 173840
ILLINOIS STATE AIRPORT SYSTEM PLAN. CONSULTANT RECOMMENDATIONS TO THE STATE OF ILLINOIS
The results are reported of a 2-year study of the airports in the 96 Illinois counties outside the Chicago metropolitan area. The report includes the methodology used to develop recommendations and contains a plan for a system of airports, identifying the airports and their role in the system, with several projects necessary to implement the system and the general timing of the projects. Many alternatives were reviewed and a tripartite planning strategy was selected; a preliminary 17-year development program was derived to examine plan feasibility. The strategy provides for the following: a business jetport within 15 air miles of every community of 10,000 or more population; a personal use airport within 15 air miles of every community of 2,500 or more population; facility expansion where capacity shortfalls are established. This report which contains the technical analysis required to derive the development program, includes sections on aircraft use, demand forecasting, facility descriptions, economic and environmental impact and strategy development. Methods for conducting the specific analyses are presented where appropriate.

Work performed in association with Clark Dietz and Associates-Engineers, Inc.

Parsons (Ralph M) Company Job No. 5013-1, Mar. 1975, v.p., Figs., Tabs., Apps.

ORDER FROM: Parsons (Ralph M) Company, 100 West Walnut Street, Systems Division, Pasadena, California, 91124

13 173843
INTERNATIONAL AIR TRANSPORTATION CONFERENCE, 1977
The papers are published which were presented at the Bi-annual specialty conference, which has as its theme, "Aviation: issues and outlook". Twenty two papers were presented at five sessions. The session on financial issues and outlook considered future requirements and availability of aviation capital, and views on the international aviation infrastructure. The session on the impact of regulatory measures covered airline deregulation, environmental regulations, and the impact of regulatory measures. The future prospects of aircraft technology was covered in the third session, and included papers on energy efficiency, fuels, wake-vortex and wind-shear prediction and avoidance systems. Session four on airside and landside considerations included aspects such as ground access demands at Los Angeles, airfield pavement design, and research and development priorities. The fifth session included the viewpoints of aircraft manufacturers, airlines, and airport operators and the international viewpoint.

Proceedings of the Air Transportation Specialty Confernence, Capital Hilton, Washington D.C., April 4-6, 1977.

American Society of Civil Engineers Proceeding 1977, 415 pp, Figs.

ACKNOWLEDGMENT: ASCE
ORDER FROM: ESL

13 173849
THE EUROPEAN I.T. CHARTER MARKET
The development of the European Inclusive Tour (I.T.) charter market and its current status is documented, and an attempt is made to determine whether or not the U.S. domestic charter market might follow a similar pattern. The European market which originated in 1952, expanded in the 1960's and by 197[illegible] surpassed that of intra-European scheduled traffic. Studies show that the charter markets have experienced their traffic growth primarily from generation, with only a small amount diverted from scheduled services. Liberal regulations have been successful even to the point of diverting some business travel to charters. The unique circumstances which contributed to this rapid development are noted. These unique circumstances are not present in the U.S. The U.S. continues to impose more limitations on charter flights than do the European countries. The value of used aircraft has been diminished since fuel costs increased. This, together with the noise retrofit/replacement policy may restrain charter operations in the U.S. by the 1980's.

Morgan, MJ
Lockheed-California Company MR 2337, June 1977, 19 pp

ACKNOWLEDGMENT: Lockheed-California Company
ORDER FROM: Lockheed-California Company, 2555 North Hollywood Way, Burbank, California, 91505

13 173853
THE FUTURE OF AVIATION. REPORT PREPARED BY THE SUBCOMMITTEE ON AVIATION AND TRANSPORTATION R&D OF THE COMMITTEE ON SICENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS
Statements are presented here concerning the organization for aviation, research and development in aviation and aeronautics, as well as aviation R&D facilities and programs. A critical review of FAA R&D proposals and facilities utilization emphasizes the need for major systems improvements and change in direction for future requirements. It is noted that the adequacy and efficiency of the Air Traffic Management System is absolutely pivotal for the health of the domestic air transportation system. A review is of NASA's wind tunnel resources concludes that the government owned wind tunnel inventory is adequate for current and currently forecast requirements with some notable exceptions. It is recommended that some form of formal flight research program, complementary to wind tunnel research be developed into an ongoing national program.

Government Printing Office Serial EE, Vol 1, Oct. 1976, 105 pp

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13 173854
THE FUTURE OF AVIATION. A COMPILATION OF PAPERS (A SUPPLEMENT) PREPARED BY THE SUBCOMMITTEE ON AVIATION AND TRANSPORTATION R&D OF THE COMMITTEE ON SICENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS
Predecessor reports on civil aviation research and development (R&D) are discussed, and the hearings and contributed papers are summarized. Papers are presented on the economic, institutional and policy issues relating to the current and future outlook for aviation, the substitution of telecommunications for air travel, the need for a national transportation policy and R&D financing, policy and other aspects. The government role in R&D (criteria for involvement, support of basic research, the need to reduce barriers, and new forms of government participation), and future needs and opportunities relating to aeronautics, technology, federal spending, specific projects, and trained manpower are discussed. The status of foreign competition and technology transfer are also discussed. The effect of the military on the aviation industry (historical perspective, needs and general trend) is covered.

Government Printing Office Serial PP, Vol 2, Oct. 1976, 101 pp

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13 173855
THE FUTURE OF AVIATION. HEARINGS BEFORE THE SUBCOMMITTEE ON AVIATION AND TRANSPORTATION R&D OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS
The hearings of the subcommittee which has attempted to lay the basis for research and development policy (R&D), and to make a useful contribution to national transportation policy are presented. The statement of the Transportation Secretary W. Coleman is presented, as well as of representatives of a bank, the National Aeronautics and Space Administration, the American Institute of Aeronautics and Astronautics, the Federal Aviation Administration, and the CIA. The Aviation consumer action project, the White House Council on International Economic Policy, the Aerospace Industries Association, and the Air Transport Association are represented. Views of the Environmental Protection Agency, the Antitrust Division of the Justice Department, the General Aviation Manufacturers Association, and the Council on Wage and Price Stability are also represented.

Government Printing Office No. 82, May 1976, 734 pp

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13 173856
THE FUTURE OF AVIATION. A COMPILATION OF PAPERS PREPARED BY THE SUBCOMMITTEE ON AVIATION AND TRANSPORTATION R&D OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES, NINETY-FOURTH CONGRESS

A comprehensive examination of the future of aviation was undertaken in an effort to lay the basis for a national civil aviation research and development (R&D) policy and in so doing, to make a useful contribution to national transportation policy. The papers solicited by the subcommittee in this effort are presented here. These papers include commentaries on areas which require future study, the thrust of the national research in civil aviation R&D, recommendations to protect and enhance the U.S. aviation industry, the climatic impact assessment program, and the environmental impact from stratospheric flight. United Airlines view on the future of aviation is given, and views are expressed on supplies and shortages, untapped airspace, and the substitution of communications for transportation in intercity travel. Helicopter R&D, economic issues, increased research in air traffic control, priorities in aeronatuics R&D, are covered as well as support and control of the creation of new technology. Small business innovations in the aerospace industry are discussed, and statements of the experimental aircraft industry, and the helicopter industry are presented.

Government Printing Office Serial EE, Vol 2, July 1976, 547 pp

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13 173861
NORTHEASTERN ILLINOIS-NORTHWESTERN INDIANA AIRPORT SYSTEM PLAN. AVIATION ACTIVITY FORECASTS

This interim final report covers the forecasting of aviation activity, airport, airspace, and landside capacity analysis of a number of system alternatives and, recommendations for a final system plan. This report also addresses the results of the data collection activities, the intercity travel analysis, the energy price and availability analysis, the evaluation of various forecast methodologies for applicability to the system plan, and the aviation activity forecasts.

Prepared for the Chicago Area Transportation Study and the Northwestern Indiana Regional Planning Commission.

Aerospace Corporation May 1977, 190 pp, Tabs., 57 Ref., Apps.

ACKNOWLEDGMENT Aerospace Corporation

13 173864
BRITAIN'S CIVIL AVIATION AUTHORITY

This report presents and overview of Britain's Civil Aviation Authority (CAA) which was established by the Civil Aviation Act of 1971 and which came into full operation on April 1, 1972. It is an independent body, separate from the Government. The CAA's area of responsibility is primarily in the following four areas: The economic regulation and well being of the civil aviation industry, including the air transport licensing duties formerly carried out by the Air Transport Licensing Board; air safety-which includes both airworthiness and operational safety; the National Air Traffic Services, which includes both air traffic control and the communications; and lastly, airport planning, the well-being of general aviation, and the collection and publication of economic and statistical data relating to civil aviation.

Civil Aviation Authority, England No Date

ACKNOWLEDGMENT Civil Aviation Authority, England
ORDER FROM Civil Aviation Authority, England, Space House, 43/59 Kingsway, London WC2B 6TE, England

13 173865
IOWA STATE AIRPORT SYSTEM PLAN UPDATE

This plan is an update of the Iowa State Airport System Plan prepared during 1971 and 1972. The current plan is intended to provide a new look at the aviation needs of the state and to revise and update the State Airport System Plan to reflect recent changes in economic conditions, in the social and environmental concerns of the public, and in the air transportation industry itself. This report discusses the development of a state plan; inventory of existing aeronautical facilities; sources of aviation statistics and forecasts; national, state, and local socio-economic factors affecting aeronautical activity; forecasts of aeronautical activity; airport systems requirements; the state airport system; requirements for navigation aids; implementation and continuous planning; and, third level air carrier feasibility study.

Prepared for the Iowa Department of Transportation.

Iowa State University, Ames, (ISU-ERI-76338) May 1976, 437 pp, Figs., Tabs., Refs., Apps.

ORDER FROM Iowa State University, Ames, Engineering Reseach Institute, Ames, Iowa, 50011

13 173870
KANSAS AIRPORT SYSTEM PLAN. TECHNICAL REPORT

In an effort to provide a base for forecasting future aviation needs, this report analyzes the existing system, discusses the social and economic characteristics, and outlines the future demand and system requirements, the future aviation system alternatives, and the airport system plan. All aspects of flight services, navigation, landing and aids, and airspace including air traffic control, land use conflicts, regulatory problems etc. are covered. All types of aircraft operations in Kansas are reviewed, and trip purpose and origin-destination analyses are studied. Future requirements related to air travel, cargo and mail, types of passenger service, airspace utilization and navaids are considered. The development of the future Kansas Airport system, the financing of the development and the implementation of the system plan are also covered.

This report was prepared with a planning grant from Federal Aviation Administration, DOT.

Kansas Department of Transportation Dec. 1976, 155 pp, Figs., Tabs., 34 Ref.

ACKNOWLEDGMENT Kansas Department of Transportation

13 173872
SOUTH CAROLINA STATE AIRPORT SYSTEM PLAN

This plan has been designed to identify those airports related to state goals for aviation, to recommend a program of airport improvements, and to, provide members of the South Carolina legislature and other responsible officials with a method for prudent public investments in the state's system of airport facilities. This report specifies the purpose and role of the public airports in the systems serving South Carolina, forecasts the future activity related to their purpose and role, and evaluates the present system of airport facilities in relation to those needed now and in the future. The approach and methodology of the study is described, and the goals and objectives related to the scheduled air carrier, the business and industrial, primary local service and special local service airport systems are stated. The purpose and definition of the above systems are also given. Major recommendations are made with regard to system airports, alternative funding programs and airport development. Annual operations forecast and recommended facilities improvements are covered. Airspace analysis, recommended legislation, implementation and financial resources are also considered.

This report was financed in part through a grant from the Federal Aviation Administration, DOT, Planning Project S-35-0045-1.

Talbert, Cox & Associates 1976, v.p., Tabs., Apps.

ORDER FROM South Carolina Aeronautics Commission, P.O. Box 1769, Columbia, South Carolina, 29202

13 173875
MARYLAND AVIATION SYSTEM PLAN

This comprehensive plan is based on an evaluation of Maryland's long-range aviation needs and alternative approaches to meeting those needs. The plan which will be the basis of future aviation expenditures, will also serve as a basis for monitoring aviation growth as part of the continuing multimodal planning process. The plan emphasizes improvement of existing facilites. Expansion of several airports is envisioned and only 4 new facilities are included in the plan. The Plan foresees Baltimore-Washington International Airport as both the major facility serving Maryland and the primary airport to serve the overflow from Washington National Airport. Recommendations are made for commuter aviation improvements, emergency heliports, and a public heliport in Baltimore. Recommendations are also made for legislation to control buildings heights around airports, assist private airports and finance airport improvements. This Maryland Aviation System Plan is an integral part of the Maryland Preliminary Transportation Plan. This final report discusses aviation policies, general aviation, the 5 regions, interregional person transportation, commuter aviation, freight transportation and legislative recommendations.

This report was partially funded by a grant from the Federal Aviation Administration, DOT.

Maryland Department of Transportation Dec. 1975, 32 pp, Figs., Tabs., Phots.

ACKNOWLEDGMENT: Maryland Department of Transportation

13 173876
MARYLAND AVIATION SYSTEM PLAN. AN ELEMENT IN THE MARYLAND PRELIMINARY TRANSPORTATION PLAN. TECHNICAL SUPPLEMENT

Pertinent excerpts are presented here of several working papers prepared and published during the course of the study for this comprehensive Plan. The Plan which is based on an evaluation of Maryland's long-range aviation needs and alternative approaches to meeting those needs, will serve as the basis for future expenditures, and as the basis for monitoring aviation growth in Maryland as part of the continuing multimodal planning process. Forecasts and distributions developed in this study will be the basis for the airfield and community impact analysis of the Baltimore-Washington International (BWI) Airport Master Plan. The plan emphasized improvements to existing aviation facilities, and the expansion of several airports. Only 4 new airports are planned. BWI is both the major carrier facility serving Maryland and the best airport to serve the overflow from the Washington National Airport. Recommentations are made regarding commuter aviation, heliports, private airports, financing and building near airports. This technical report details the characteristics of the study area, and discusses in detail the aviation demand forecast (air carrier activity, air cargo, general aviation). Issues and alternatives relating to air carriers and general aviation are reviewed. Details of system plan implementation are also discussed.

This report was partially funded by a grant from the Federal Aviation Administration, DOT.

Maryland Department of Transportation Mar. 1976, 550 pp, Figs., 1 App.

ACKNOWLEDGMENT: Maryland Department of Transportation

13 174618
STANDARD CODES FOR NAMED POPULATED PLACES AND RELATED ENTITIES OF THE STATES OF THE UNITED STATES

The Standard Codes for Named Populated Places and Related Entities of the states of the United States include codes for named populated cities, towns, villages, and similar communities, whether or not incorporated, and several categories of named entities that are similar to these in one or more important respects. In addition to incorporated and unincorporated named populated cities, towns, and villages, this standard provides codes for scattered rural communities; important military and naval installations; townships in the states where such units have governmental powers; Indian reservations, national and state parks, named places that form parts of other places as defined; and named places with no permanent residents, but important for transportation, industrial, or commercial purposes, such as unpopulated railroad points, airports, and shopping centers. The standard code for places is seven characters in length, the first two characters of which identify the state (using the standard state code or abbreviation). The last five numeric characters identify the place within the state and provide an alphabetic ordering of the place names. In addition to the place name and its standard code, the list also provides the name and standard code for the county (or counties) in which the place is located, the postal ZIP code of the servicing post office (or offices), cross-references to former or alternative names, an inclusion code, a class designator code, and a cross-reference to the Worldwide Geographic Location Code issued by the Office of Finance of the General Services Administration.

Source tape is in ASCII character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products, if you have questions. Price includes User's Guide, PB-274 151.

McEwen, HE White, HS
National Bureau of Standards Data File NBS/DF-77/009b, Jan. 1977, n.p.

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274150/2ST

13 174619
STANDARD CODES FOR NAMED POPULATED PLACES AND RELATED ENTITIES OF THE STATES OF THE UNITED STATES; USER'S GUIDE

Included are standard codes for named populated cities, towns, villages, whether incorporated or unincorporated, important military and naval installations, townships, Indian reservations, named places that form parts of other places, places important for transportation, industrial, or commercial purposes, i.e., unpopulated railroad points, airports, and shopping centers. The standard code is seven characters in length, the first two of which identify the State. The last five numeric characters identify the place within the state and provide an alphabetic ordering of the place names. In addition to the place name and its code, the list also provides the name and code for the county (or counties) in which the place is located, the ZIP Code of the servicing post office (or offices) cross-references to former or alternate names, an inclusion code, a class designator code, and a cross-reference to the Worldwide Geographic Location Code issued by the General Services Administration.

For data file on magnetic tape, see PB-274 150.

McEwen, HE
National Bureau of Standards NBS/DF-77/009c, Nov. 1977, 19 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274151/0ST

13 174886
IMPLEMENTATION PLAN FOR AN AIR TRANSPORTATION RESEARCH INFORMATION SERVICE

This report presents scope and plans for an air transportation research information service (ATRIS) that would provide the user community with abstracts of documents and resumes of research projects that relate to the air transport field. The general design for the service is similar to that of other Transportation Research Board modally oriented services for highway (HRIS), railroad (RRIS), and maritime (MRIS) research information. Thus ATRIS would not only serve special needs for air transport information, but used in conjunction with the other modal services could provide for full coverage of transportation research information. The potential user community for ATRIS services and products is discussed; recommendations are made for specific types of interactions between ATRIS and the user community. Input scope is presented in terms of twenty-one subject areas and sixteen types of information. Output scope is presented in terms of announcement bulletins, special bibliographies, and batch-mode and on-line retrieval services. The report includes an implementation plan for the first three years of ATRIS development and operations. The plan contains specific proposals for input-output operations in each year, cost estimates for the proposed operations, and funding strategies for meeting the cost requirements through support from sponsors, institutional supporters, and user charges. (Author)

National Research Council Final Rpt. FAA-EM-77-14, Sept. 1977, 135 pp

Contract DOT-FA77WA-3872

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049301/5ST

13 175117
COCKRILL BEND MASTER PLAN REPORT

The report establishes the feasibility of an industrial park at Cockrill Bend and serves as a guide for design and construction. It directs a research effort to focus upon potential industries for location at Cockrill Bend, and it may serve as a promotional tool. The report also establishes the administrative framework, examines economic alternatives, and analyzes the relationship to the proposed airport. (Color illustrations reproduced in black and white)

Prepared by Hensley-Schmidt, Inc., Chattanooga, Tenn.

Tennessee Department of Economic & Community Dev, Economic Development Administration Final Rpt. EDA-78-007, Nov. 1977, 301 pp

Grant EDA-04-6-01428

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-275836/5ST

13 175540
PROBLEMS IN WORLD-WIDE STANDARDIZATION OF THE UNITS OF ALTITUDE MEASUREMENT

The U.S. commitment to a voluntary conversion to metric units raises changeover problems in the fields of air traffic control and airspace

management. This report begins by discussing current practice in altitude measurement and the rules for height maintenance now in effect worldwide. Four desirable features are given for an altitude measurement system, encompassing both the units of height measurement and the designation of cruising levels. Three alternative bases for the design of such a system are discussed and related to the desirable characteristics. Problems associated with each of the approaches are discussed and the many factors to be considered and the many interrelationships involved are examined.

Sponsored in part by Federal Aviation Administration, Washington, D.C.

Gilsinn, JF
National Bureau of Standards, Federal Aviation Administration Tech Rpt. NBSIR-77-1386, Feb. 1978, 25 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-277982/5ST

13 175951
DEPARTMENT OF TRANSPORTATION NATIONAL PLAN FOR NAVIGATION

The DOT National Plan for Navigation (NPN) is designed to provide a readily available document which addresses how the Department of Transportation (DOT) plans to meet its future needs and its obligation to the user. This is the third issue of the NPN. It is the official source of navigation system policy and plans for the DOT which is the major provider of civil used aids to navigation. In particular, it summarizes the plans for Government provided radio aids to navigation. While individual types of user equipment are not addressed, knowledge of system plans will enable equipment manufacturers to adjust their planning and scheduling. The NPN is the medium for addressing navigation problems. It describes the characteristics of navigation systems and then explains the various factors that must be considered in choosing a system and determining if one can be substituted for another. This document is intended to provide general information with references for the reader who wishes additional details. The background on navigation systems, currently available systems, and plans for future systems as well as phasing schedules are provided to enable the user to determine not only what is currently available, but to plan for probable obsolescence and the ability of new and improved systems. (Author)

Supersedes report dated April 72,AD-741 944.

Goldsmith, A
Department of Transportation DOT-TST-78-4, Nov. 1977, 110 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052269/8ST

13 176158
THE CRITICAL ROLE OF GOVERNMENT IN INTERNATIONAL AIR TRANSPORT

The report describes the pervasive role of U.S. and foreign governments in international air transportation matters, and U.S. Government efforts to implement the provisions of the International Air Transportation Fair Competitive Practices Act of 1974 to respond to discriminatory and unfair practices that are disadvantageous to U.S. carriers.

A Report to the Congress.

General Accounting Office ID-77-50, Mar. 1978, 190 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-27°503/8ST

13 176233
ENGINEERING AND DEVELOPMENT PROGRAM PLAN-FREQUENCY SPECTRUM MANAGEMENT

This program plan describes spectrum management activities supporting aviation's use of the frequency spectrum. Long range spectrum planning is provided through coordination with national and international organizations. Policy, criteria, and standards are provided to spectrum users to ensure efficient spectrum utilization. Electromagnetic compatibility analyses and representation in national/international forums are provided to ensure the suitability of available spectrum. New measurement and analysis techniques are provided to improve overall spectrum management. The Frequency Spectrum Management element is divided into three subprograms. The Radar/Beacon Spectrum Planning subprogram includes projects for radar, ATCRBS, and DABS. The Communications/Navigation Spectrum Planning subprogram includes projects for navigation, CAS, communications, MLS, and satellites. The Spectrum Applications Engineering subprogram includes projects for RF propagation, spectrum surveillance, spectrum coordination, electromagnetic radiation measurements, and the exercising of specialized models and computer programs developed as functional tools of spectrum management.

Federal Aviation Administration FAA-ED-21-4, Apr. 1978, 35 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A054606/9ST

13 176625
USING AVIATION RESOURCES IN THE UNITED STATES MORE EFFICIENTLY

There are 12,000 airfields in the United States and over 4,000 of these serve the general public and military community. The Federal Government spends millions of dollars annually to promote safe operation of aircraft in the Nation's airspace. This report identifies opportunities available to Government agencies to consolidate and share functions and to reduce government investment and expenditures for Federal support of aviation. Selected civilian and military airfields were reviewed to see if any effort is being made to avoid unnecessary duplication and to limit the Government's investment in aviation support.

A Report to the Congress.

General Accounting Office Mar. 1977, 93 pp, 4 App.

ACKNOWLEDGMENT: General Accounting Office
ORDER FROM: General Accounting Office, 441 G Street, NW, Washington, D.C., 20548

13 176720
A CASE STUDY OF CONTINENTAL AIRLINES UNDER PROPOSED REGULATORY REFORM OF DOMESTIC AIR TRANSPORTATION (STUDIES IN THE ECONOMICS OF FEDERAL TRANSPORTATION POLICIES, NUMBER 7)

This work primarily addresses the issue of whether there would be any major restructuring of the current domestic airline networks with the advent of reform to the existing federal economic regulatory policy. It is centered on the 1975 Aviation Act which calls for freer entry and exit and increased pricing flexibility for the domestic scheduled interstate air transportation industry. Continental Airlines was selected from among the "trunk carriers" as a scenario for the study. The carrier's past operations indicate that it would likely be a forerunner in route expansion, route rationalization and innovative pricing under regulatory reform. Implementation of the study was feasible because of the availability of a linear programming model that is well suited for economic analysis of the air carrier firm. /Author/

Taylor, MA
Massachusetts Institute of Technology CTS 77-14, May 1977, 150 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

13 176722
GLOSSARY OF AIR TRANSPORTATION TERMS

The purpose of this glossary is to standardize the various terms and phrases related to air transportation which are in everyday use at the Civil Aeronautics Board (CAB) or within CAB publications. This glossary also facilitates better communication and understanding by eliminating the duplication and possible inconsistencies which appear in other glossaries of CAB publications. The scope includes definitions of economic and statistical terms and phrases which are peculiar to the air transportation field as they relate to general CAB usage. Also included are those terms which have a specialized use or definition when incorporated in speech or publication within the CAB.

Civil Aeronautics Board 1st Ed. Feb. 1977, 118 pp

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Civil Aeronautics Board, Bureau of Accounts and Statistics, Washington, D.C., 20428

13 176731
COMMENTS ON THE STUDY CONSEQUENCES OF DEREGULATION OF THE SCHEDULED AIR TRANSPORTATION INDUSTRY
No Abstract.
Air Transport Association of America report to Congress.

General Accounting Office CED-77-38, Feb. 1977, 63 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
GA1.13:CED-77-38

13 176734
ECONOMIC ASPECTS OF FEDERAL REGULATION ON THE TRANSPORTATION INDUSTRY
No Abstract.
Hearings before the Task Force on Tax Expenditures, Government Organization and Regulation of the Committee on the Budget, U.S. House of Representatives, 95th Congress, First Session, 13-19 July 1977.

United States House of Representatives July 1977, 508 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
Y4.B85/3:T68/2

13 176735
THE DEMISE OF THE CROSS-SUBSIDY CONCEPT IN U.S. DOMESTIC AIR TRANSPORTATION: REASONS AND IMPLICATIONS
This paper discusses the U.S. Civil Aeronautics Board's (CAB) declaration in its Phase 9 Decision of the Domestic Passenger Fare Investigation (DPFI) that cross subsidy is inherently unworkable given the present structure of the U.S. air transport industry, and that the domestic air fare structure "should be more closely aligned to the cost structure than it presently is and, indeed, that our long-term goal should be the creation of a fare structure that is entirely cost based". The background to this policy reversal is examined, and some of its longer-run implications are traced. This policy shift was fundamental to the general shift in attitude toward regulation that has recently been observed within CAB. Also, it explains the degree of success that has been achieved in obtaining legislative changes in basic parameters of the U.S. airline regulatory structure. The generalization of these results to other areas of regulation is also discussed.

Eads, GC
Rand Corporation P 6063, Dec. 1977, 23 pp

ACKNOWLEDGMENT: Rand Corporation
ORDER FROM: Rand Corporation, 1700 Main Street, Publications Department, Santa Monica, California, 90406

13 177006
FIELD FORMULATION OF THE NATIONAL AIRPORT SYSTEM PLAN (NASP)
No Abstract.

Federal Aviation Administration Apr. 1977, 8 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591
FAA 5090.3A

13 177007
AIRPORT DEVELOPMENT AID PROGRAM (ADAP) AUTHORITY, PROGRAM POLICY, ELIGIBILITY, AND ALLOWABILITY CRITERIA. BOOK 1
No Abstract.
Originally issued August 25, 1971.

Federal Aviation Administration Reprint 1977, 108 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591
FAA 5100.17

13 177008
INTERIM GUIDANCE PERTAINING TO SPONSOR CERTIFICATION OF COMPLIANCE WITH REQUIREMENTS IMPOSED UNDER THE AIRPORT AID DEVELOPMENT PROGRAM (ADAP)
No Abstract.

Federal Aviation Administration Sept. 1977, 10 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591
FAA 5100.34

13 177014
DEVELOPMENT OF STATE STANDARDS FOR GENERAL AVIATION AIRPORTS
No Abstract.

Federal Aviation Administration Mar. 1977, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
TD4.8/5:150/5100-13

13 177016
THE DECLINE OF SUPPLEMENTAL AIR CARRIERS IN THE UNITED STATES
No Abstract.
Hearings before the Subcommittee on Monopoly and anticompetitive Activities of the Select Committee on Small Business, U.S. Senate, 95th Congress, First Session.

United States Senate 1977, n.p.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
Y4.SM1/2:Ai7/4Pt2

13 177017
AIRLINE DEREGULATION AND AVIATION SAFETY
No Abstract.
Hearings before a subcommittee of the Committee on Government Operations, U.S. House of Representatives, 95th Congress, First Session.

United States House of Representatives Oct. 1977, 729 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
Y4B74/7:Ai7/11

13 177023
FAA STANDARD SUBJECT CLASSIFICATION SYSTEM
No Abstract.

Federal Aviation Administration Nov. 1977, 11 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591
FAA 0000.1E

13 177386
AIR TRANSPORTATION
The purpose of this text is to provide a survey of the air transportation industry. The chapters are divided into three distinct parts. Part one, the History of Air Transportation, discusses the development of the airplane, the beginning of commercial air transportation, and the airline industry and federal legislation. Part Two, Regulation of Air Transportation, discusses the Federal Aviation Act of 1958, the Federal Aviation Administration, safety in air transportation, the Civil Aeronautics Board, air carriers and economic regulations. Part three, Administration of Air Transportation, discusses air carrier management and organization economics of air carrier routes, air carrier accounting and financial analysis, and legal aspects of air transportation. A reproduction of the Federal Aviation Act of 1958 is included in the appendix. Also, a glossary of air transport terms are

provided. The definitions given in the glossary have no legal or official status and are meant instead to be brief and helpful, rather than technically precise and exhaustive.

Kane, RM Vose, AD
Kendall/Hunt Publishing Company 6th Ed. 1977, v.p.

ORDER FROM: Kendall/Hunt Publishing Company, 2460 Kerper Boulevard, Dubuque, Iowa, 52001

13 177445
STANDARDIZATION: TECHNOLOGY VERSUS MANAGEMENT
An examination is made of the trends toward standardization, the similarity of military processors and the risks of choosing a standard design. A philosophy from which initial standardization objectives can be attained is presented along with recommendations for industry and DOD actions.

IEEE Proceeding of the National Aerospace Electron Conference, NAECON '77, Dayton, Ohio, May 17-19, 1977.

Radkowski, EJ Blake, RG
Institute of Electrical and Electronics Engineers Proceeding 77CH1203-9 NAECON, 1977, pp 204-212, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

13 178259
BRIEF CONSIDERATIONS ON 1977 [Courte reflexion sur l'annee 1977]
Commentary on air transport policy and organization, traffic and tariff trends, aircraft and their operation, airport infrastructure and the aerospace industry.

Desmas, G *ITA Bulletin* No. 7/8, Feb. 1978, pp 153-220

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Institut du Transport Aerien, 4 rue de Solferino, Paris (7e), France

13 178466
NEW AIRCRAFT TECHNOLOGY AND ITS IMPACT ON THE AIRPORT--AN AIRLINE VIEWPOINT
On January 1, 1977, FAA Amendment 91-136: Part 91--General Operating and Flight Rules, Subpart E--Operating Noise LImits (NEW) became effective. This amendment, more commonly known as the Retrofit/Replacement Rule, is the first time in history that a fleet of aircraft has been federally legislated into forced retirement for environmental reasons. Amendment 91-136 will require all commercial transports that have not been certified to FAR Part 36 noise limits, and having maximum takeoff weights greater than 75,000 pounds, to meet the FAR part 36 noise limits according to a phased compliance schedule resulting in 100% compliance by January 1, 1985. The author's goal will be to describe the impact this rule will have on American Airlines' future fleet requirements and what effects these requirements will have on the airport system.

ASCE, Air Transportation Division Special Conference: Inst Air Transp Conference Proceeding, Washington, D.C., April 4-6, 1977.

Linn, RJ (American Airlines Incorporated)
American Society of Civil Engineers Proceeding 1977, p 363

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

13 178473
AIRCRAFT NOISE
An overview of current and proposed commercial airplane noise regulations is presented. Noise contributions from the individual components of a typical airplane powered by high bypass ratio engines are described followed by a discussion of the constituent elements of the airplane noise reduction engineering process. A brief status report is provided on the state of technology of each of the major airplane noise components. The scope of a required national research effort is indicated, as implied in recently proposed aircraft noise regulatory requirements.

Noise and Fluids Eng. Presented at the Winter Annual Meeting of ASME, Atlanta, Georgia, 27 November-2 December 1977.

Russell, RE (Boeing Company)
American Society of Mechanical Engineers Proceeding 1977, p 29

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

13 178731
IOWA STATE AIRPORT SYSTEM PLAN: 1978 UPDATE
A state airport system plan is a representation of the aviation facilities required to meet the immediate and future air transportation needs of the state and to achieve the overall transportation goals of the state. The Plan covers a 20-year period in three phases. A five-year (1978-1982) short-range period is the basis for definitive programming; a five-year (1983-1987) intermediate-range period requires continuous planning coordination to be viable; a 10-year (1988-1997) long-range period requires continuous review and flexible programming to guide future development. The plan formulated in this document is an update of the Iowa State Airport System Plan Update which was prepared in 1976 for the Iowa Department of Transportation by the Engineering Research Institute (ERI) of the Iowa State University. Much of the inventory work and forecast methodology developed by the ERI for the 1976 update was used in this effort. The recommended system includes the limited number of airports at which scheduled air carrier service is available since these afford essential passenger and cargo access to a national network of air carrier airports. Other airports serving general aviation exclusively were evaluated for inclusion in the system using a formula which judged each airport's relative importance to the state system based on: existing and forecasted based aircraft; existing and forecasted total annual operations; existing and forecasted community population; county population growth trend, 1950-1970; county employment growth trend, 1950-1970; community interest; distance to nearest alternative system airport, and primary runway (paved or turf). Airports are classified according to proposed short-range development. The system is composed of 80 airports. System airports are eligible for all types of state airport funds, including development, planning and safety project funds. An additional 35 publicly owned airports and 6 proposed new airports are considered "system candidate" airports and are eligible for planning and safety project funds. The estimated cost to develop the 80 system airports to meet aviation demand over the twenty year period are: Short-range, $109,293,900; intermediate-range, $27,641,500; long-range, $45,732,700; total, $182,668,100. Short-range costs are particularly high in comparison to the costs associated with the remainder of the twenty-year period due to the immediacy or "back log" of needs that exists today.

Iowa Department of Transportation May 1978, 93 pp, Figs., Tabs., 11 App.

ORDER FROM: Iowa Department of Transportation, Planning and Research Division, 300 Lincoln Way, Ames, Iowa, 50010

13 179386
FIVE YEAR HIGHWAY CONSTRUCTION AND AIRPORT DEVELOPMENT PROGRAM
The Arizona Department of Transportation's 1979 Fiscal Five-Year Construction Program is presented in two parts. The highway construction program includes those projects under contract or advertised as of June 30, 1978 and fiscal year 1978 carry-over projects. The projects of the five year program are listed in order of priority within each fiscal year. The estimated amount for each project and reasons for the assigned priority are included. The airport development program includes carry over projects from fiscal year 1978, and a list of the 1978-1983 development programs. Airport and county project description and funding levels are included.

Arizona Department of Transportation July 1978, 62 pp

ACKNOWLEDGMENT: Arizona Department of Transportation
ORDER FROM: Arizona Department of Transportation, 206 South 17th Avenue, Pheonix, Arizona, 85007

13 179389
STRONGER FEDERAL AVIATION ADMINISTRATION REQUIREMENTS NEEDED TO IDENTIFY AND REDUCE ALCOHOL USE AMONG CIVILIAN PILOTS
Alcohol intoxication is the cause or contributing factor in many general aviation accidents; that is, all civilian flying except by U.S. airlines. Use of driving conviction information of pilots and improved medical examination procedures could help reduce the incidence of alcohol-related accidents. Minimum blood-alcohol levels and mandatory testing of pilots suspected of drinking are needed to deter pilots from drinking and flying.

A Report to the Congress.

General Accounting Office CED-78-58, 29 pp, 3 App.

ACKNOWLEDGMENT: General Accounting Office
ORDER FROM: General Accounting Office, P.O. Box 1020, Distribution Section, Washington, D.C., 20013

13 179876
AVIATION NOISE ABATEMENT AND THE FEDERAL GOVERNMENT
This article outlines the Airport and Aircraft Noise Reduction Act (HR 8729). This act is designed to encourage local officials to plan for orderly development of their airport while discouraging noncompatible uses from being constructed in areas affected by aircraft noise. It also assists airline owners of older, noisy aircraft in replacing those planes with newer, quieter, more energy-efficient aircraft; or to retrofit the older planes with sound absorbing material. Title I requires the Secretary of Transportation to establish a system of measuring noise and determining its impact on people. It establishes a $15 million planning grant program to aid air carrier airports in developing noise contour maps and programs to avoid non-compatible uses of land surrounding airports. And it establishes a grant program of $150 million in Fy 1979, and $250 million in Fy 1980 to assist airport operators in carrying out this voluntary noise compatibility program. Title II adds $570 million to what is available for Fy'79 and Fy'80. Title III provides assistance to aircraft operators for compliance with noise standards.

Mineta, NY *Airport Services Management* Vol. 18 No. 7, July 1978, pp 17-19

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

13 179877
AIRLINE REGULATORY REFORM: CONSUMER PROTECTION OR BUREAUCRATIC RIP-OFF?
The increasing pressure for deregulation by the Federal Government, Congress, and consumer advocate groups is discussed. An overview of the present regulatory system is presented. With airlines and the CAB both taking a new look at airline fare competition, and the airline's past history of customer service competition, several aspects of the system still remain as areas of concern to civic and airport parties. These include the following: Automatic transfer of dormant route authority; protection of air service to small and isolated communities; removal of archaic route restrictions; controlled phasing of automatic entry and exit of carriers; and, acceleration of the regulatory process. Lastly, it is noted that what is really needed by the industry and the nation is a Congressionally mandated National Air Transportation Policy.

Huber, AJ *Airport Services Management* Vol. 18 No. 7, July 1978, pp 21-24

ACKNOWLEDGMENT: Airport Services Management
ORDER FROM: Lakewood Publications, 700 South 4th Street, Reprint Services, Minneapolis, Minnesota, 55415

13 180141
RECENT DEVELOPMENTS IN AVIATION LAW
Questions of coverage in aviation insurance are considered along with the discovery rule in connection with the statue of limitations. Attention is also given to the negligence law and damages, the principle of strict liability, the primary jurisdiction of regulatory agencies, aspects of air carrier liability, decisions involving a rigid application of use taxes on aircraft owners, and airport zoning and environmental regulation. Statutory and administrative developments are examined, taking into account the new traffic management system adopted by the FAA, noise level standards for turboject-engine powered aircraft and large propeller-driven aircraft, the Civil Aeronautics Board Air Freight Liability and Claims Rules, and the signing into law of the Airport and Airway Development Act Amendment of 1976.

Eleventh Annual Symposium on Back to Basics Approach to Aviation Litigation, Dallas, Texas, March 3-5, 1977.

Quirk, WH, III Harrison, RK *Journal of Air Law and Commerce* Vol. 43 No. 2, 1977, pp 341-355

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-19297)
ORDER FROM: AIAA

A78-19297

13 180159
THE BASIC ELEMENTS OF AIR LAW
The concept represented by the term "air law" is examined and a division of air law into private and public air law, and national and international air law is considered. A description is presented of the various legal sources which provide a basis for public and private air law. It is pointed out that the regulations of air law can best be understood if they are assigned to certain elements, taking into account air space, airports, aerospace vehicles, aviation personnel, aviation enterprises, and air space supervision. Attention is also given to questions concerning the organization of air traffic. [German]

Schwenk, W
Heymanns (Carl) Verlag KG Vol. 26 June 1977, pp 103-117

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-39659)
ORDER FROM: AIAA

A77-39659

13 180177
AVIATION SYSTEM PLANNING--AIRPORT PLANNING IN MARYLAND
The approach which has been used by the state of Maryland in planning for future airport needs is described. Airports are considered as competitive attractions, and aircraft and air passenger forecasts are generated on the basis of the socioeconomic characteristics of small geographic units. Aircraft and air passengers are assigned to airports by computer modeling techniques.

Research supported by the Federal Highway Administration.

Rubin, DL (Comsis Corporation) *ASCE Journal of Transportation Engineering* Vol. 47 June 1977, pp 16-18

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-43657)
ORDER FROM: AIAA

A77-43657

13 180180
TECHNICAL AVIATION REGULATION IN NEW ZEALAND
The administrative powers and technical functions established by the New Zealand Civil Aviation Act of 1964 are described, and the processes involved in formulating and administering technical regulations are discussed. In general, the act stipulates the formulation of measures for carrying out the Chicago convention and its annexes and amendments, for regulating civil aviation in New Zealand, and for securing the safety of air traffic, aircraft, passengers and property transported. The regulations in effect, including those related to conditions of flight, flight operations, registration and marking of aircraft, airworthiness requirements, radio equipment, airports, training organizations, logbooks, and licensing of maintenance and flight crew personnel, are considered. The distinction is made between formal regulations and the more speedily-enacted and efficiently-administered mandatory general orders.

Heller, PP *Air Law* Vol. 2 No. 3, 1977, pp 162-166

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-45470)
ORDER FROM: AIAA

A77-45470

13 180490
AVIATION SYSTEM MODELING STUDY AND ALTERNATIVES
The Aviation System Modeling Study was directed toward two primary goals: an improved understanding of the U.S. aviation system, and technology. There are three major categories into which the individual study efforts may be subdivided. These three categories are: special issue studies, task studies, and data base development.

Operations Research, Incorporated Final Rpt. NASA-CR-156715, Oct. 1975, 10 pp

Contract NAS5-24033

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-20051/6ST

13 180491
14(C) HANDBOOK, RECONVEYING LAND, HANDBOOK FOR VILLAGE CORPORATIONS
The handbook provides assistance to village corporations established under the Alaska Native Claims Settlement Act in carrying out Section 14(C) of the Act. Under that Section the villages are required to reconvey lands for certain purposes soon after they become owners of lands which they have selected. Lands must be reconveyed to those who were users of the land

when the Act passed (December 18, 1971), to the municipalities for purposes of corporation and to agencies responsible for the operation of airports. The handbook also provides guidelines for general village land planning. The handbook is accompanied by a supplement entitled 'Discussion of Legal Issues Related to 14(C) Reconveyances, 6/23/74.'

Joint Federal-State Land Use Plann Comm for Alaska July 1975, 42 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-279900/5ST

13 180511
ANALYTICAL STUDIES FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY. VOLUME VIII. NOISE ABATEMENT: POLICY ALTERNATIVES FOR TRANSPORTATION

The report is a comprehensive discussion of the policy and legal issues involved in Noise Abatement Programs. It includes: information on the distribution of noise in the U.S., the trends in noise generation, the methods of noise measurement. It also provides an analysis of cost/benefit calculations with some illustrative examples.

Library of Congress Catalog Card no. 77-87121.

National Research Council, Environmental Protection Agency ISBN-0-309-02648-2, Oct. 1977, 203 pp

Contract EPA-68-01-2430

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-279536/7ST

13 180760
METROPOLITAN WASHINGTON AIRPORT POLICY ANALYSIS

This report presents results of an analysis of the Metropolitan Washington Airports undertaken by the Federal Aviation Administration (FAA) to establish the appropriate role of Washington National and Dulles International Airports within the Metropolitan Washington area. The report is intended to guide future development and operation of these facilities. A wide range of policy options defining various roles for the Metropolitan Airports are tested and evaluated. Quotas, curfews, and the possible wide-body aircraft service at National Airport are examined for potential policy impacts on regional air travelers, community residents, and airport investment requirements. (Author)

Fromme, WR
Federal Aviation Administration Final Rpt. FAA-AVP-77-36, Nov. 1977, 89 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052349/8ST

14 166618
A STUDY OF THE MARKET FOR AVIONICS AND AVIATION SUPPORT EQUIPMENT IN SINGAPORE
The market research was undertaken to study the present and potential US share of the market in Singapore for avionics and aviation support equipment; to examine growth trends in Singapore end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques were also reviewed.

Sponsored in part by Trade Center, Singapore.

Applied Research Corporation, Domestic & International Business Administration Survey Rpt June 1977, 88 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DIB-77-09-505

14 168617
AVIONICS AND AVIATION SUPPORT EQUIPMENT BRAZIL
The market research was undertaken to study the present and potential US share of the market in Brazil for avionics and aviation support equipment; to examine growth trends in Brazilian end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques were also reviewed.

Foreign market survey report.

Lindsey, RP
Trade Center, Domestic & International Business Administration Aug. 1977, 113 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DIB-77-11-500

14 168618
INDIA MARKET RESEARCH REPORT ON AVIONICS AND AVIATION SUPPORT EQUIPMENT
The market research was undertaken to study the present and potential US share of the market in India for avionics and aviation support equipment; to examine growth trends in Indian end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers indetermining current and potential sales and marketing opportunities. The trade promotional and marketing techniques were also reviewed.

Foreign market survey report.

Sundaran, C Rangaraj, V
American Consulate General, Domestic & International Business Administration Sept. 1977, 74 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DIB-77-11-502

14 168671
THE MARKET FOR AIRLINE AIRCRAFT: A STUDY OF PROCESS AND PERFORMANCE
The key variables accounting for the nature, timing and magnitude of the equipment and re-equipment cycle are identified and discussed. Forecasts of aircraft purchases by U.S. trunk airlines over the next 10 years are included to examine the anatomy of equipment forecasts in a way that serves to illustrate how certain of these variables or determinants of aircraft demand can be considered in specific terms.

Subm-Prepared in Cooperation with Simat, Helliesen and Eichner, Inc., Tarrytown, N. J.

Little (Arthur D), Incorporated NASA-CR-154617, Nov. 1976, 204 pp

Contract NASW-2971

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-28100/4ST

14 169136
A SURVEY OF THE MARKET FOR AVIONICS AND AVIATION GROUND SUPPORT EQUIPMENT IN THE UNITED KINGDOM
The market research was undertaken to study the present and potential US share of the market in the United Kingdom for avionics and aviation ground support equipment; to examine growth trends in U.K. end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques were also reviewed.

Foreign market survey report.

Stratford (Alan) and Associates Limited, Domestic & International Business Administration Sept. 1977, 87 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DIB-77-12-502

14 169507
MARKET RESEARCH STUDY SPECIAL COMMUNICATIONS EQUIPMENT. PART I, SINGAPORE
The market research was undertaken to study the present and potential US share of the market in Singapore for special communications equipment; to examine growth trends in Singaporean end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques were also reviewed.

Domestic & International Business Administration Sept. 1977, 74 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

DIB-78-01-503

14 169779
PROCEDURES FOR MULTI-STATE MULTI-MODE ANALYSIS: FIRST YEAR'S RESEARCH
The report presents an analytical procedure designed to measure quantitatively the interactions between economic development potential and transportation service improvements. The transportation services of interest include both existing and developmental modes and intermodal services. The analysis focuses on the Multi-State Corridor extending from Brunswick, Georgia to Kansas City. Significant results of the first year's research are: (1) Establishing variable-sized network zones; (2) identifying state highways, rail lines, and navigable inland waterways; (3) defining 53 industry/commodity groups, along with production coefficients for labor, energy, capital, and materials; (4) preparing a 111 zone, 53 commodity flow table for the U.S.; (5) calibration of mode split equations for seven industry/commodity groups; (6) developing and calibrating market share equations; (7) testing the overall procedure in four zones in Northern Mississippi. No developmental conclusions can be drawn from the limited test.

Prepared in cooperation with Alabama University, Huntsville, Auburn University, Alabama, and Memphis State University, Tennessee.

Jones, PS
Georgia Institute of Technology, Alabama University, Huntsville, Auburn University, Memphis State University, Department of Transportation Final Rpt. DOT/OS-60512-8, Dec. 1977, 259 pp

Contract DOT-OS-60512

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-276001/5ST

14 170852
COMPUTERIZATION IN TICKETING AND PASSENGER PROCESSING [L'automation des titres de transport et le processus des passagers]
Survey of the use of automation in air transportation. [French]

IATA Review Vol. 10 No. 1, Jan. 1975, pp 4-5

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: International Air Transport Association, IBM Building, 5 Place Ville Marie, Montreal 113, Quebec, Canada

14 172823
COMMUNICATION SYSTEM 3000 E AND SEAT RESERVATION SYSTEM ESK 900 E OF SINGAPORE AIRLINES
Since mid-1974 Singapore Airlines have been using a communication system type 3000 E and an ESK 900 E seat reservation system in Singapore. Both systems are described and their features are pointed out.

Hon, HL Huber, N *Telefon Report* Vol. 12 No. 2, Mar. 1977, pp 72-76

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

14 173827
TRENDS IN MARKET SHARES, REVENUES AND YIELDS, SCHEDULED SERVICE, DOMESTIC TRUNKS AND LOCAL SERVICE CARRIERS, CALENDAR YEARS 1966-1976
No Abstract.

Civil Aeronautics Board July 1977, 63 pp, Tabs.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
C31.202:M34/966-76

14 173874
MARKETING AND POLICY STUDY OF COMMUTER AIRLINE SERVICE IN SOUTH CAROLINA
The findings, recommendations and supporting documentation are presented of the first of a 2-phase study. This report assesses the passenger and cargo demand for scheduled commuter airline service, identifies specific markets and routes which have the potential to support such service, and prepares a plan for implementation of service which is economically and operationally feasible. The details are given of the socioeconomic development of the area, air transportation development and potential, cost estimating relationships, and route analysis. The study concludes that there are a number of markets and routes involving South Carolina cities which have the potential to support scheduled commuter airline service. Five routes linking South Carolina's three metropolitan cities with other southeast metropolitan areas have been forecast to produce operating profits for commuter airline operations with 15-seat Beech-99 aircraft. Further findings relating to commuter operations, the breakeven range for most routes and fare levels are presented. Recommendations relating to the promotion of air services, regulations, implementation, funding, etc. are also presented.

This report was prepared for the South Carolina Aeronautics Commission.

Simat, Helliesen and Eichner, Incorporated Aug. 1975, v.p., Figs., Tabs.

ORDER FROM: South Carolina Aeronautics Commission, P.O. Box 1769, Columbia, South Carolina, 29202

14 176721
COMPETITION AND EFFICIENCY IN REGULATORY AIRLINE CITY-PAIR MARKETS (STUDIES IN THE ECONOMICS OF FEDERAL TRANSPORTATION POLICIES, NUMBER 8)
Factors which influence the cost of providing air service are important in determining the optimal industrial organization. While most attention has been placed on the minimum optimal firm size, this thesis examines a second source of economic inefficiencies. It is argued here that competition in city-pair markets leads to suboptimal schedules. The tendency of airlines--and firms in many other industries--to schedule head-to-head suggests that the quality of a schedule of flights, for a given quantity of output, should decline as the number of competitors increases. In order to test this theoretical result, a model of schedule delay is developed, drawing upon the theory of consumer surplus. A series of structural equations is then estimated, supporting the above conclusions by finding a positive correlation between delay and the number of carriers--for a given number of flights. On the basis of these results, it is argued that airline city-pair markets should be regulated as monopolies. Monopolists, perceiving the socially-optimal market demand curve, will offer a more efficient schedule. The CAB must, however, regulate the schedule quality in order to prevent the monopolist from limiting the quantity to the profit-maximizing level. This can probably be accomplished by setting schedule standards and enforcing them with the threat of competition. /Author/
Nason, SD
Massachusetts Institute of Technology CTS 77-16, Sept. 1977, 88 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology
ORDER FROM: Massachusetts Institute of Technology, Center for Transportation Studies, Cambridge, Massachusetts, 02139

14 179000
INDUSTRY TOPS $2 BILLION IN SALES PER YEAR
This special report on the growing helicopter market discusses a range of topics that includes a view of the industry as it nears the $2 billion sales mark; the decreasing ownership cost; offshore helicopter operations; U.S. helicopter exports, and imports; heavy-lift helicopters; Western Europe's growing foothold in the export and import markets; the growing attack roles for the helicopter; new weapons and sensor research conducted by the Army; Coast Guard look for a replacement for its Sikorsky in its short-range recovery program; Navy accelerates NATO standardization; USAF is studying what it needs in its new search and rescue helicopter; gains in technology have accelerated corporate helicopter usage; chemical spraying for a variety of purposes is growing increasingly controversial; helicopter research has shifted to Ames Research Center; and, Avionics expansion is keyed to greater flexibility for utility and corporate flying.

Wetmore, WC *Aviation Week and Space Technology* Vol. 109 No. 1, July 1978, pp 44-47

ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

15 117474
INVESTIGATION OF WIND CONDITIONS DURING EARLY MORNING HOURS AT LOS ANGELES INTERNATIONAL AIRPORT
Los Angeles International Airport (LAX) uses a unique runway utilization pattern to minimize noise pollution between midnight and 0600. During these hours, all approaches are conducted to the east, and all takeoffs are conducted to the west. The low-altitude portions of all takeoff and landing operations are thereby conducted over the Pacific Ocean. During these operations, pilots have occasionally reported encountering unusual wind conditions. It is the objective of this study to use the Lockheed-Huntsville mobile laser Doppler unit velocimeter unit to monitor winds and wake vortices in the approach zone of runway 6R to identify the sources of the wind anomalies reported by the pilots. No incidents of pilot-reported wind anomalies occurred during the five-week data collection period. (Author)

Krause, MC Eberle, WR Miller, GM Gorzynski, EJ
Lockheed Missiles and Space Company Incorporated Final Rpt. FAA-RD-77-116, LMSC-HREC-TR-D497095, Oct. 1977, 77 pp

Contract DOT-TSC-1190

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049141/5ST

15 155045
AUTOMATIC WEATHER STATIONS FOR USE AT AIRPORTS
Two automatic weather systems for use at French airports are described. The first (SAOMA) is based on a microprocessor with the task of determining visibility. The functioning, sensors, processing, and general organization of the station are described. The second system (IMCA) is intended to provide the user with details of a large number of meteorological parameters, including wind direction and speed, cloud height, air temperature and humidity, and pressure. This system is based on a minicomputer, the characteristics of which are outlined, and allows video as well as numeric output.

Tran-Transl. Into English from "Sta. Autom. D'Observation Meteorol. Sur Aerodrome", Automated Meteorol. Systems, World Meteorol. Organ. (Geneva), Rept. No.5 Wmo-420, Isbn-92-63-10420-4, 1975 p 30-37.

Fichaux, C
Kanner (Leo) Associates NASA-TT-F-17373, WMO-420, Jan. 1977, 12 pp

Contract NASW-2790

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-15580/2ST

15 167331
THUNDERSTORM PREDICTION FOR USE IN AIR TRAFFIC CONTROL (0-6 HOURS TIME RANGE)
This report updates results, described in a previous interim report, of efforts to develop short range (0-6 hr) thunderstorm forecasts for aviation. In the 0-2 hr range, systematic comparisons were made of the capabilities of three techniques of varying complexity in predicting the movement of radar echoes associated with thundery activity. Ten-and 30-minute data sequences of radar data were used produce 10-, 30-, 60-, and 90-minute forecasts. Results show that in general, the complex technique has little advantage over simple techniques which can be implemented locally on the mini-computer. In the 2-6 hr range, a combination of classical and model output statistics (MOS) were used to develop probability forecasts of thunderstorm activity over most of the U. S. east of the Rockies. Forecasts valid for the periods 1700-2100, 2000-2400, and 2300-0300 GMT are now available for the spring and summer seasons and are being transmitted to the field three times daily by teletype.

See also AD-A025 958.

Alaka, MA Charba, JP Elvander, RC
National Weather Service Final Rpt. FAA-RD-77-40, July 1977, 36 pp

Contract DOT-FA74WAI-488

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A045015/5ST

15 168664
CLEAR AIR TURBULENCE (A BIBLIOGRAPHY WITH ABSTRACTS)
Clear air turbulence and its relationship to air transportation is documented in the cited research reports. Its meteorological occurrences, its detection, and aircraft encounters with the phenomena are investigated. (This updated bibliography contains 282 abstracts, 35 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0705, NTIS/PS-75/761, and NTIS/PS-75/008.

Habercom, GE, Jr
National Technical Information Service Oct. 1977, 287 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0857/1ST

15 169180
NEW YORK CITY PILOTS AUTOMATIC TELEPHONE WEATHER ANSWERING SERVICE (PATWAS) TEST. VOLUME I
An improved Pilots Automatic Telephone Weather Answering Service (PATWAS) was subjected to a year-long test in the New York City metropolitan area. The improvements consisted primarily of the following: (1) (1) user access to three route-oriented briefings, (2) an increase in the number of access lines to PATWAS, (3) more frequent updating of information, (4) the addition of special early morning recordings, (5) capability to request meteorological and aeronautical information from the Weather Message Switching Center for incorporation into the PATWAS message, (6) reduction in the time required for updating, (7) addition of more meteorological and aeronautical information to the PATWAS message, (8) new and more efficient magnetic tape equipment, (9) installation of an acoustic enclosure for PATWAS tape recording, and (10) more efficient organization of the message format. The purpose of the experiment was to test and evaluate the new PATWAS products, schedules, user acceptance, and the effects on the telephone briefing workload at the flight service station (FSS). In addition, the test permitted the gathering of technical performance data which could serve as the basis for a new, consolidated, national system for the mass dissemination of weather information. It is concluded that the improved PATWAS disseminates more weather information, reduces FAA/NWS telephone briefer workloads, is preferred over the basic PATWAS, and is acceptable to the general aviation public.

See also Volume 2, AD-A047 248.

Staiano, F Shochet, E
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-80-Vol1, FAA-NA-77-26, Oct. 1977, 124 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047247/2ST

15 169181
NEW YORK CITY PILOTS AUTOMATIC TELEPHONE WEATHER ANSWERING SERVICE (PATWAS) TEST. VOLUME II
No abstract available.

See also Volume 1, AD-A047 247.

Staiano, F Shochet, E
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-80-V2, FAA-NA-77-21, Oct. 1977, 315 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047248/0ST

15 169185
VERIFICATION OF WIND MEASUREMENT WITH MOBILE LASER DOPPLER SYSTEM
The Mobile Atmospheric Unit is a laser Doppler velocimeter system designed for the remote measurement of the three components of atmospheric wind. The unit was tested to verify the capability of the system to measure wind remotely and to evaluate alternative data-processing algorithms. Remotely measured wind data are compared with concurrent data measured by anemometers on a 150-meter meteorological tower. The test program showed that the laser Doppler velocimeter system is an accurate instrument for the remote measurement of winds.

Brashears, MR Eberle, WR

Lockheed Missiles and Space Company Incorporated Final Rpt. FAA-RD-77-117, LMSC-HREC-TR-D497071, Sept. 1977, 162 pp

Contract DOT-TSC-1098

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047252/2ST

15 169468
EXECUTIVE SUMMARY: NEW YORK CITY PILOTS AUTOMATIC TELEPHONE WEATHER ANSWERING SERVICE (PATWAS) TEST [Final rept. Aug 75-Jul 76]

An improved Pilots Automatic Telephone Weather Answering Service (PATWAS) was subjected to a year-long test in the New York City metropolitan area. The improvements consisted primarily of the following: (1) user access to three route-oriented briefings, (2) an increase in the number of access lines to PATWAS, (3) more frequent updating of information, (4) the addition of special early morning recordings, (5) capability to request meteorological and aeronautical information from the Weather Message Switching Center for incorporation into the PATWAS message, (6) reduction in the time required for updating, (7) addition of more meteorological and aeronautical information to the PATWAS message, (8) new and more efficient magnetic tape equipment, (9) installation of an acoustic enclosure for PATWAS tape recording, and (10) more efficient organization of the message format. The purpose of the experiment was to test and evaluate the new PATWAS products, schedules, user acceptance, and the effects on the telephone briefing workload at the flight service station (FSS).

Staiano, F Shochet, E
National Aviation Facilities Experimental Center Final Rpt. FAA-NA-77-23, FA/RD-77/80, Oct. 1977, 14 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046755/5ST

15 169550
ICE FOG (A BIBLIOGRAPHY WITH ABSTRACTS)

The bibliography includes citations relating to ice formation, modification, dispersal and forecasting. Problems of white outs and thermal pollution effects in arctic regions are discussed. (This updated bibliography contains 57 abstracts, 8 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0881 and NTIS/PS-75/770.

Brown, RJ
National Technical Information Service Nov. 1977, 62 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/1014/8ST

15 169553
FOG DISPERSAL (A BIBLIOGRAPHY WITH ABSTRACTS)

Studies concerned with fog dispersal techniques are cited, primarily concentrating on dispersal at airports. The physics and chemistry of fog dispersal, dispersing chemicals, the use of helicopter downwash to remove fog, and electrical dispersing methods are included. (This updated bibliography contains 214 abstracts, 22 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0835, NTIS/PS-75/750 and NTIS/PS-75/099.

Brown, RJ
National Technical Information Service Nov. 1977, 219 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/1024/7ST

15 169735
ENGINEERING AND DEVELOPMENT PROGRAM PLAN-WIND SHEAR

This is a development plan for solutions to the aviation hazards created by low-level wind shear in the terminal area. It describes the four-year development program to satisfy National Airspace System (NAS) user needs for current and predicted information concerning wind shear at the Nation's airports. Included in the plan are: (1) efforts to better characterize low-level wind shear, (2) plans to define the hazards of wind shear for the aviation community, (3) tasks required to develop ground-based devices for hazardous wind shear detection and movement, (4) investigations into the use of airborne equipment to detect hazardous wind shear and then either warn the pilot of its presence and/or assist him in coping with it, (5) a description of how the data collected on wind shear will be processed, analyzed and reported, (6) plans to improve low-level wind shear predictions are presented, and (7) provisions for integrating wind shear data into the NAS by developing data formats and displays suitable to users (air traffic controllers, pilots and the National Weather Service). The FAA groups and other Federal Government agencies participating in this effort are identified. Program management responsibilities are addressed. A program schedule with milestones is presented and program funding requirements are identified. (Author)

Supersedes rept. no. FAA-ED-15-2, dated Mar 76, AD-A025 511.

Federal Aviation Administration FAA-ED-15-2A, Aug. 1977, 81p

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A048352/9ST

15 170187
HELICOPTER RESPONSE IN GUSTY WINDS ABOUT A BUILDING

This paper discusses helicopter performance during landing and takeoff from elevated heliports in urban areas during gusty winds. A mathematical model simulating the time-dependent wind field over a two-dimensional building is developed. Secondly, a set of simplified dynamic equations governing the motion of a helicopter are derived. Finally, the performance of the helicopter in the unsteady wind field about the building is computed for the helicopter landing or taking-off on a 6 degree glide slope over the building.

Conference on Aerosp and Aeronaut Meteorol and Symp on Remote Sensing from Satellite, 7th, Preprint, Melborune, Florida, November 16-19, 1976.

Frost, W (Marshall Space Flight Center) Reddy, KR Camp, DW
American Meteorological Society Proceeding 1976, pp 7-14, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

15 172454
LIGHTNING AND AIRCRAFT

The author reviews the principal causes of lightning and discusses why aircrafts may be involved with it, what to expect from it, and finally how pilots can help researchers learn more about lightning to design even better protection from its effects in the future. Although much is still not understood about the lightning formation process, it can be concluded that aircrafts are usually struck by flashes that would have occurred anyway, but the aircraft being conductive causes the current to divert towards the aircraft rather than continue on in another direction. It is impossible, however, to predict when or where a lightning strike will occur. Careful study of weather reports and use of radar can help in avoiding areas of precipitation. Laboratory studies have been made of the ways a lightning flash might produce a source of ignition within an aircraft fuel tank. Simulated lightning flashes have also been shown to be capable of igniting vapors at fuel vent outlets under certain air flow conditions. Other indirect effects are produced by lightning strikes such as flight and engine malfunctioning. The most hazardous effects a pilot is likely to receive from a strike is temporary blindness from the flash or a mild electric shock when the strike occurs. The author concludes that two trends in aircraft design may affect the level of accidents attributable to lighting. The first is the increasing use of miniaturized, solid-state components, and secondly the increasing use of nonmetallic materials in place of aluminum in skins and structures.

Plumer, JA *Air Line Pilot* Vol. 47 No. 2, Feb. 1978, p 12

ACKNOWLEDGMENT: Air Line Pilot
ORDER FROM: Air Line Pilots Association, 1625 Massachusetts Avenue, NW, Washington, D.C., 20036

15 172713
WEATHER RADAR FOR LIGHT CENTERLINE THRUST AIRCRAFT

An airborne weather radar installation has been developed for light centerline thrust aircraft. A pod was developed and tested to attach to the underside of the wing and provide a location for a light weight antenna-receiver-transmitter unit. The offering of this installation to operators of these aircraft provides additional capability in the detection and avoidance of significant weather systems.

Prepared for SAE Meeting, 29 March-1 April 1977.
Grandfield, J (Cessna Aircraft Company) Barrett, B
Society of Automotive Engineers Preprint SAE 770486, 1977, 11 pp, 13 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

15 172727
SOME OBSERVATIONS OF THUNDERSTORM-INDUCED LOW-LEVEL WIND VARIATIONS
The character of a thunderstorm outflow case is described using data from a multilevel 461-m meteorological tower in central Oklahoma. Statistical information is presented which verifies that an aircraft on takeoff or approach can be frequently affected by headwind loss coupled with downdrafts (short landing on approaches) and these conditions are more prevalent at lower tower levels.

Goff, RC (National Severe Storms Laboratory) *Journal of Aircraft* Vol. 14 No. 5, May 1977, pp 423-428, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

15 172735
TECHNICAL, ECONOMIC AND OPERATIONAL ASPECTS OF AN FAA ENGINEERING STUDY AND FEASIBILITY DETERMINATION FOR A GROUND-BASED WARM FOG DISPERSAL SYSTEM
This paper describes a study conducted by the FAA to determine the feasibility of and prepare a conceptual design for a ground-based warm fog dispersal system. The paper describes the study's four-step approach: first, determination of operational requirements for a ground-based fog dispersal system; second, an analysis of known fog dispersal techniques for possible application to system design; third, development of a conceptual/preliminary design for a cost-effective fog dispersal system at a selected airport; and fourth, determination of cost estimates to install and operate a fog dispersal system using the selected technique at the selected airport.

Proceedings of the 7th Conference on Aerosp and Aeronaut Meteorol and Symposium on Remote Sensing from Satellites, Melbourne, Florida, November 16-19, 1976.

Melewicz, FV (Federal Aviation Administration)
American Meteorological Society Proceeding 1976, pp 219-224, 10 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

15 173096
TURBULENT CHARACTERISTICS OF SOME CANADIAN CUMULUS CLOUDS
The turbulent characteristics of 17 Canadian cumulus clouds have been documented using the measurements from a specially instrumented T-33 aircraft. Most of the 33 cloud penetrations were made through the tops of cumuli 1-4.5 km in depth. Turbulent energy spectra over a range of wavelengths from 15 to 2500 m have been obtained for the two horizontal and the vertical gust velocities. Mean flow characteristics, especially any expected updrafts, tended to be obscured by turbulent fluctuations. Based on measured accelerations, estimates were made of expected vertical forces on several aircraft with a wide range of wind loadings. Cumulus clouds similar to those studied do not pose a safety hazard to these aircraft, and crew and passengers can easily tolerate the turbulence levels.

MacPherson, JI (National Aeronautical Establishment, Canada) Isaac, GA *NRC Mechanical Engineering Div Quarterly Bulletin* DME/NAE 2, No Date, n.p., 24 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

15 173819
THE CIRCULATION AND WEATHER OF 1977
The major change in the circulation during the course of the winter 1976-77 was the development of an immense blocking high over the polar region during early January, accompanied by expansion of the deep Aleutian low to fill the entire north Pacific and a southward displacement of the zonal westerlies over much of the Hemisphere. The spring circulation anomalies were nearly out of phase with those that had prevailed during the preceding winter over much of the Northern Hemisphere. The spring pattern became established early in March and persisted with nearly as much regularity as the winter pattern had. During summer, above normal mid-tropospheric heights again prevailed over high latitudes. Below normal heights over much of Canada led to a cool summer there and along the northern United States border east of the Rockies. Hot, dry weather continued over much of the Western United States and above normal heights over the Southeast. During the Fall of 1977, except for a small area of weak blocking on the Asian side the North Pole heights were generally below normal at high latitudes and fast zonal westerlies prevailed around the hemisphere at middle latitudes throughout most of the season.

Wagner, AJ (National Meteorological Center) *Weatherwise* Vol. 31 No. 1, Feb. 1978, p 25, Figs.

ACKNOWLEDGMENT: Weatherwise
ORDER FROM: American Meteorological Society, 45 Beacon Street, Boston, Massachusetts, 02108

15 174979
LIGHTNING PROTECTION OF AIRCRAFT
No abstract available.

Fisher, FA Plumer, JA
General Electric Company NASA-RP-1008, Oct. 1977, 530 pp

Contract NAS3-19080

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-11024/4ST

15 175247
VERIFICATION OF WIND MEASUREMENT TO 450-METER ALTITUDE WITH MOBILE LASER DOPPLER SYSTEM
The Lockheed mobile atmospheric unit is a laser Doppler velocimeter system designed for the remote sensing of winds. The capability of the laser Doppler velocimeter accurately to measure winds to 150-meter altitude has been previously demonstrated. To assess the capability of the laser Doppler velocimeter to measure winds at higher altitudes, the system was tested adjacent to the 481-meter instrumented WKY-TV television transmission tower at the National Severe Storms Laboratory test site near Norman, Oklahoma. Comparisons between the laser-measured winds and the anemometer-measured winds are presented. The sources of discrepancies between laser-measured wind and anemometer-measured wind are discussed. (Author)

Brashears, MR Eberle, WR
Lockheed Missiles and Space Company Incorporated Final Rpt. FAA-RD-77-181, LMSC-HREC-TR-D497230, Dec. 1977, 263 pp

Contract DOT-TSC-1190

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049944/2ST

15 175288
TEST REPORT ON THE APPLICATION OF THE LINDE FOG REMOVAL EQUIPMENT AT THE ERDING AIR BASE [Erprobungsbericht ueber den Einsatz der Linde-entnebelungsapparatur auf dem Fliegerhorst Erding]
With the Linde apparatus atmospheric air is dried and heated. It was found that wind has the strongest influnece because it carries away the purified air masses. With a head wind or cross wind of 2 knots the apparatus is effective only for short stretches, necessitating the need for fog removal equipment at both sides of the runway. Under calm conditions a 50 m large runway can be kept free of fog over 200 to 250 meters. [German]

Subm-Sponsored by Bundesamt fuer Wehrtech. U. Beschaffung. Language in German.

Willeke, H Katheder, F
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-75/8, May 1975, 59 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-14763/4ST

15 175300
ATMOSPHERIC ENVIRONMENTAL CONDITIONS DURING TESTING OF THE WDL-1 AIRSHIP IN GHANA AND UPPER VOLTA [Bericht ueber Begleitende Untersuchungen bei der Erprobung des Luftschiffes WDL-1 in Gaana und Obervolta. Atmosphaerische Umgebungsbedingungen]
Test flights were made in July and August 1976 in Ghana and the Upper Volta with an airship (blimp) with a view to using this means of transportation in countries not having sufficiently developed infrastructure. Surveys of the atmospheric conditions averaged over the year are presented. Conditions were generally found acceptable for flights; however, a problem concerning loading operations still needs to be resolved. [German]

Roth, R
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-553-77/4, Mar. 1977, 81 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-14004/3ST

15 175302
ATMOSPHERIC PRESSURE JUMPS MEASURED WITH ARRAYS OF SENSITIVE PRESSURE SENSORS IN THE VICINITY OF CHICAGO'S O'HARE INTERNATIONAL AIRPORT
An experiment designed to evaluate the use of arrays of sensitive pressure sensors for gust-front detection is described. First results of the experiment (which is still underway at Chicago's O'Hare airport have demonstrated the feasibility of predicting the motion of such density currents by using an array of such sensors. Using data sets obtained in June through August of 1976, implications for the design of arrays to provide warnings of gust front systems in airport environments are discussed. Although over 80% of the pressure jumps over the O'Hare system were tracked, several events went undetected at two or more of the outer array locations. It is therefore concluded that the optimum array density will involve a compromise between practicality and a need for high reliability in detection.

Bedard, AJJ Cairns, MM
National Oceanic and Atmospheric Administration Tech Memo NOAA-TM-ERL-WPL-28, NOAA-77123008, Oct. 1977, 32 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-277518/7ST

15 175303
WORLDWIDE MARINE WEATHER BROADCASTS: SECTION 1. RADIOTELEGRAPH BROADCASTS. SECTION 2. RADIOTELEPHONE BROADCASTS. SECTION 3. RADIOFACSIMILE BROADCASTS. SECTION 4. RADIOTELEPRINTER BROADCASTS. SECTION 5. WEATHER BROADCASTS FOR THE GREAT LAKES, CONTINUOUS BROADCASTS--NOAA WEATHER RADIO (VHF-FM)
The booklet serves as a source of marine weather broadcast information. It is primarily for the use of U.S. naval and merchant ships, but is available to other ships. It contains information on marine weather broadcasts in all areas of the world where such service is provided. Sections 1 through 4 contain details of radiotelegraph, radiotelephone, radiofacsimile, and radioteleprinter transmission, respectively. The NOAA Weather Radio continuous broadcasts (VHF-FM) and Great Lakes marine broadcasts are listed in Section 5. In Sections 1 through 4 the broadcasts are arranged according to ocean areas.

Prepared in cooperation with Naval Weather Service Command, Washington, D.C. See also report dated Sep 73, COM-74-50273.

National Weather Service, Naval Weather Service Command NOAA-78011604, July 1977, 129 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-277403/2ST

15 175534
DEVELOPMENT OF VOCABULARY FOR DEMONSTRATION OF SPEECH CONCATENATION SYSTEM
The purpose of this report is to document the development of a full and comprehensive vocabulary of words and phrases (predominately phrases), derived by message analysis of a large sample of verbal output from the New York City Pilots Automatic Telephone Weather Answering Service (PATWAS). This vocabulary is developed to test and evaluate the capability of disseminating PATWAS messages by a prototype speech concatenation system being developed at the National Aviation Facilities Experimental Center (NAFEC). One of the key objectives of the prototype model is to demonstrate the capability of disseminating PATWAS messages by the method of automatic message composition. In general, the aim is to provide a full and comprehensive vocabulary designed to include: a message introduction, a winds aloft forecast, hourly observations, flight precautions, synopsis reports, terminal forecasts, route forecasts, and Notices to Airmen (NOTAM's) on a route-oriented basis. The vocabulary as contained in this report will be subject to test and evaluation with the objective of reducing the vocabulary size to the point where it is neither greater than nor less than what is required.

Shochet, E
National Aviation Facilities Experimental Center Intrm Rpt. FAA-RD-77-164, FAA-NA-77-43, Mar. 1978, 50 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051996/7ST

15 175982
COMPARISON OF SLANT AND RUNWAY VISUAL RANGE RELATIONSHIPS FOR 100, 124, AND 155 FEET
Ratios of slant visual range measured from heights of 100, 124, and 155 feet to horizontal visual range measured at 15 feet were computed for low-visibility regimes. These ratios were found to be related to the linear fog density profile expressed as the difference in horizontal atmospheric transmittance between the top (100-, 124-, and 155-foot) and bottom (15-foot) levels. It was determined that useful estimates of slant visual range could be provided through these relationships. The predictions would be most accurate when the visibility decreased with height (most common fog structure). A slight increase in accuracy would also be expected with decreasing slant height.

Continuation of Rept. No. FAA-RD-77-34, AD-A041134.

Lewis, W
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-191, FAA-NA-78-1, Apr. 1978, 19 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052870/3ST

15 175984
WIND SHEAR MODELING FOR AIRCRAFT HAZARD DEFINITION
Wind shear at low altitudes in the terminal area has been identified as hazardous to aircraft operations. Mathematical models of wind profiles have been developed for use in fast time and manned flight simulation studies aimed at defining and eliminating these wind shear hazards. A set of wind profiles and associated wind shear characteristics for stable and neutral boundary layers, thunderstorms, and frontal winds potentially encounterable by aircraft in the terminal area are given. Wind shear is defined as significant changes in wind speed and/or direction up to 500 m above the ground that may adversely affect the approach, landing, or takeoff of an aircraft. Engineering models of wind shear for direct hazard analysis are presented in mathematical formulae, graphs, tables, and computer lookup routines. The wind profile data utilized to establish the models is described as to location, how obtained, time of observation and number of data points up to 500 m. These models provide the three components of wind speed in two-dimensional vertical planes, i.e., as functions of the vertical and horizontal coordinates. Statistical data is provided, where available, as to the risk of exceeding the wind shear environment predicted by the models.

Prepared in cooperation with FWG Assoc., Inc., Tullahoma, TN., Contract NAS8-32217.

Frost, W Camp, DW Wang, ST
National Aeronautics and Space Administration Final Rpt. FAA-RD-78-3, Feb. 1978, 257 pp

Contract DOT-FA76-WA1-620

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A053178/0ST

15 177443

SEVERE DOWNSLOPE WINDSTORM AND AIRCRAFT TURBULENCE EVENT INDUCED BY A MOUNTAIN WAVE

A detailed analysis is presented of the large-scale, mesoscale and turbulent-scale features of a major downslope windstorm event in central Colorado on 11 January 1972. The storm is found to be associated with a moderate amplitude baroclinic disturbance moving across the northwestern United States within an intense zonal current. Optimal conditions for strong mountain wave generation are detectable from sounding data 12-24 hr in advance and about 1000 km upstream. The mesoscale structure is dominated by a single quasi-hydrostatic wave of extreme amplitude and variable location, with corresponding variations in the windstorm structure. Hazards to aircraft from this kind of event are illustrated and discussed. Avoidance by vertical path deviation is found to be impractical.

Lilly, DK (National Center for Atmospheric Research) *Journal of the Atmospheric Sciences* Vol. 35 No. 1, Jan. 1978, pp 59-77, 17 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

15 180138

AIRPORT WEATHER SERVICE-SOME FUTURE TRENDS

The current state of aviation weather forecasting and its effect on weather-related aircraft accidents are reviewed. The authors predict that new approaches will be necessary if the technological gap is to be narrowed between weather forecasting and aircraft design and utilization. The importance of mesoscale modeling and new remote sensing devices is discussed. (In creased emphasis in these areas is to some extent a response to aviation needs and also to the need for improved synoptic-scale modeling.) Statistical and deterministic models that can assist in the prediction of the evolution of area weather are currently under development, but major obstacles, such as the difficulty in the parameterizing the planetary boundary layer, suggest that useful models are at least 10 years away. Furthermore, it is predicted that, although weather modification and aircraft design will undoubtedly play important roles, the most immediate improvements will come from departures from traditional approaches to forecasting.

Beran, DW Hooke, WH Little, CG Coons, F *American Meteorological Society Bulletin* Vol. 58 Nov. 1977, 5 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-17695)

ORDER FROM: AIAA

A78-17695

16 117475
DERIVATION OF GROUNDSPEED INFORMATION FROM AIRBORNE DISTANCE MEASURING EQUIPMENT (DME) INTERROGATORS
Laboratory and flight tests were conducted to investigate the derivation of aircraft groundspeed from the range rate pulse information obtained from ARINC 568 distance measuring equipment (DME) interrogators. Initial tests determined the limitation of the range rate pulse output from the two interrogaters tested. Subsequent effort was directed toward digital filtering techniques to improve accuracy and response time of the DME-derived groundspeed. Best results were obtained with either accelerometer complementation or Kalman filtering with velocity and acceleration observations. Both techniques achieved standard deviations of about 3 knots when compared to Inertial Navigation System (INS) groundspeed. (Author)

Gallagher, J Lynn, W Pursel, RH
National Aviation Facilities Experimental Center Final Rpt. FAA-NA-77-28, FAA-RD-77-135, Nov. 1977, 56 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049277/7ST

16 117476
HIGH-ALTITUDE AREA NAVIGATION (RNAV) ENROUTE SIMULATION
A four-part dynamic simulation using two systems of navigation, area navigation (RNAV) and very high frequency omnidirectional radio range (VOR), was conducted using the Digital Simulation Facility (DSF) at the National Aviation Facilities Experimental Center (NAFEC). The objectives were to: (1) validate the results derived from fast-time simulation tests of RNAV and Jet-VOR route structures through real-time simulation tests, (2) determine whether benefits resulted from the application of RNAV in the high-altitude enroute environment, and (3) establish the impact that the number of potential aircraft conflict situations has on the ATC system and system user. Simulations were conducted in a fast-time mode, without controller intervention, for an area encompassed by five high-altitude Chicago Air Route Traffic Control Center (ARTCC) sectors and for a single selected sector of the five. Real-time simulations, with controller intervention, were conducted for both the five-and one-sector configurations.

Willett, FMJ Taylor, MR
National Aviation Facilities Experimental Center Final Rpt. FAA-NA-77-4, FAA-RD-77-128, Dec. 1977, 87 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A049315/5ST

16 147378
AEROSAT ACCESS CONTROL SUMMARY
The report consists of three basic sections. Section 2 is a discussion of the communications concepts germane to AEROSAT access control. It defines and reviews the principles of multiplexing, multiple access, demand access, and access control and relates them to the system parameters of AEROSAT. Section 3 is a complete summary of the three AEROSAT access control studies. The evaluation approach taken, the access control techniques considered, and the conclusions reached by each study are summarized. No attempt is made to critique these results or to combine them into a common set of recommendations. Section 4 presents the recommendations for AEROSAT access control techniques, mainly based upon the results of the three studies and the access control techniques defined in appropriate AEROSAT documentation. Also included are recommendations for AEROSAT test and evaluation, as well as future simulation efforts.
Sponsored in part by Department of Transportation, Washington, D.C. Office of the Secretary.

Blank, HA Kinal, GV Klein, L
Computer Sciences Corporation, Transportation Systems Center, Federal Aviation Administration, Office of the Secretary of Transportation Final Rpt. DOT-TSC-FAA-76-18, DOT-TSC-OST-76-20, Oct. 1976, 90 pp

Contract DOT-TSC-1079

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-261325/5ST

16 158517
ALASKAN AIR NAVIGATION REQUIREMENTS. VOLUME II. PART 2. APPENDICES
Contents: (A) Estimates of Potential User Benefits, (B) Updated FAA Alaska Region VORTAC Site Recommendations, (C) Comparison of Alaska's Air Transportation System Safety and Scheduled Departure Performance, (D) Alaska Airport Data Base, (E) Estimated Alaska Air Taxi Origin-Destination Statistics, (F) Ceiling and Visibility Minimums, (G) Estimated Landing Probabilities, (H) Distribution of Air Carrier Traffic, (I) Community Dependency on air Transportation Ranking Model, (J) Descriptions of Candidate Navigation Aid Locations, (K) Summary of Alaska-Based Aircraft Avionics Equipment.
See also Volume 3, AD-A038 663.

Solomon, HL Heine, W Stephenson, AR McConkey, E
Long Island University Final Rpt. FAA-RD-76-27-2-Pt 2, Jan. 1977, 268 pp

Contract DOT-FA72WA-3098

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A038637/5ST

16 158522
ALASKAN AIR NAVIGATION REQUIREMENTS. VOLUME II. PART I. NEAR TERM BENEFITS ANALYSIS OF THE ALASKAN AIR NAVIGATION SYSTEM
This Volume (II) presents an analysis of the problems and near-term solutions related to Alaska's Air Navigation System. The needs of the air taxi operators and major intra-state scheduled air carriers are considered based on such figures of merit as enroute navigation gaps, traffic volume, landing probabilities and candidate navigation system characteristics. The study concludes that 6 VOR/DME's and 6 NDB/DME's would be adequate to satisfy most of Alaska's near-term enroute and terminal air navigation requirements, respectively. Recommended implementation sequences are provided for each combination of candidate NAVAID (NDB, NDB/DME, VOR, VOR/DME and TACAN) and application (enroute, approach and dual--enroute/approach). (Author)
See also Volume 2, Part 2, AD-A038 637.

Solomon, HL Heine, W Stephenson, AR McConkey, E
Systems Control, Incorporated Final Rpt. FAA-RD-76-27-2-Pt1, Jan. 1977, 78 pp

Contract DOT-FA72WA-3098

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A038662/3ST

16 158523
ALASKAN AIR NAVIGATION REQUIREMENTS. VOLUME III. FAA ALASKAN VHF OMNIDIRECTIONAL RANGE (VOR) SITE COVERAGE
Map overlays were developed for 30 existing and 28 proposed VOR sites in Alaska for the Federal Aviation Administration. The overlays were to be utilized to determine the VOR coverage provided by these sites in Alaska. A new terrain-data extraction technique, called the Chromatic Extraction Technique, was developed for this task and is described. (Author)
Work performed under Contract Number F19628, 76-C-0017, DOT-FA70WAI-175. See also Volume 2, Part 1, AD-A038662.

Harlem, RL Berstein, H
Electromagnetic Compatibility Analysis Center, (649E) Final Rpt. FAA-RD-76-27-3, ECAC-PR-75-077, Jan. 1977, 21 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A038663/1ST

16 158604
OPERATIONAL REQUIREMENTS FOR FLIGHT CONTROL AND NAVIGATION SYSTEMS FOR SHORT HAUL TRANSPORT AIRCRAFT
Operational procedures for use in an assumed short haul transport route were evaluated. The curved path approaches in airline use by large jet airplanes were studied. The characteristics of these approaches were included in development of operational procedures for transitions and

approaches by a jet STOL transport. These procedures were used in a simulation experiment and were satisfactory for autoflight operation. A minimum turn radius of 3,000 ft. for a 180 final turn was determined for the wind conditions tested. The accuracy of the approaches was very good.

Morrison, JA
AVCON Aviation Consultants, Incorporated NASA-CR-137975, Nov. 1976, 142 pp

Contract NAS2-9028

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-17034/8ST

16 159049
IMPLEMENTATION OF AREA NAVIGATION IN THE NATIONAL AIRSPACE SYSTEM: AN ASSESSMENT OF RNAV TASK FORCE CONCEPTS AND PAYOFFS

This document presents the results of a three year study effort to define the cost and operational impact, and to assess the economic benefits which are expected to accrue to the ATC system and various users of the National Airspace System as a result of the implementation of Area Navigation. Previous impact analyses are expanded to include the primary aspects of ATC system operation and to include a broad spectrum of user groups, route structure, and types of operation. System impact results are presented pertaining to slant range effects, VORTAC requirements, ATC automation, airspace capacity, route development, charting, flight inspection, VNAV, controller training, and controller productivity. User impact results are presented in terms of fuel and time increment benefits for several classes of users, comparing 2D RNAV to VOR in the high and low altitude structures, and comparing 2D, 3D, and 4D RNAV to VOR/radar vectors in the terminal area. Estimates are made of total annual savings due to RNAV, and an analysis of user equipment cost versus benefits is presented. The results of the user and system impact analyses, together with results of related system studies in the areas of avionics standards, waypoint standards, route designs, and flight technical error are utilized to develop an RNAV operational concept. The system design and implementation concepts presented are based on the Task Force concept, but modified as appropriate to insure maximum benefits to the ATC system and a broad spectrum of users of the National Airspace system. (Author)

Clark, WH Bolz, EH Solomon, HL Stephenson, AR
Systems Control, Incorporated Final Rpt. FAA-RD-76-196, Dec. 1976, 481 pp

Contract DOT-FA72WA-3098

ACKNOWLEDGMENT: NTIS
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AD-A039225/8ST

16 165953
AREA NAVIGATION ROUTE WIDTH REQUIREMENTS

This report presents the results of a study to determine if a requirement exists for reduced route widths in the National Airspace System. The basis for this investigation was the recommendation by the FAA/Industry RNAV Task Force that provision be made for constant and reduced route widths in order to handle the anticipated growth in air traffic by allowing more routes in the same airspace and less restriction on application of parallel offsets. The recommendation included a reduction of high altitude route widths from or-4.0 nm in the 1977-1982 period to or- 2.5 nm in the post-1982 period. Route width requirements for both high altitude enroute and terminal areas are quantified, based on the impact of route width on route efficiency, airspace capacity, and route length. Results of this study, which are based on analysis of specific, high traffic demand geographical areas, indicate that there is a requirement to eliminate the current splayed route widths and provide constant width routes, but that there is no requirement for reduction of route widths below a constant or-4 nm in the high altitude enroute structure, or below the or-2 nm or or-4 nm, dependent upon distance from the VORTAC, which are currently required in the terminal area. (Author)

Stephenson, AR Clark, WH
Systems Control, Incorporated Final Rpt. FAA-RD-77-21, Dec. 1976, 118 pp

Contract DOT-FA72WA-3098

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040153/9ST

16 166011
ALASKAN AIR NAVIGATION REQUIREMENTS. VOLUME I. OVERVIEW

This report describes the unique air navigation problems of the Alaskan Region. Present and future navigation aids are described relative to their applicability to this area. Conclusions as to the near term and far term feasibility of these alternatives are summarized. Recommedations for a near term solution are presented using VORTAC, NDB, and DME systems. An operational feasibility system using Differential Omega is also described for a possible far term solution. (Author)

See also Volume 2, Part 1, AD-A038 662 and Part 2, AD-A038 637.

Simolunas, AA Quinn, GH
Federal Aviation Administration Final Rpt. FAA-RD-76-27-1, Jan. 1977, 72 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040664/5ST

16 166045
AN OPERATIONAL EVALUATION OF OMEGA FOR CIVIL AVIATION OCEANIC NAVIGATION

Interest in Omega navigation for satisfying oceanic air navigation requirements is rapidly increasing. In particular, Omega is under serious consideration by major airlines as a Loran-A replacement. This report describes a flight evaluation program performed from August 1975 to September 1976 on oceanic routes to Central and South America, and over the Atlantic and Pacific Oceans. The primary objective of this work was to determine the operational reliability and suitability of Omega navigation for satisfying oceanic air navigation requirements. More than 300 hours of data were gathered, including data on the new stations Liberia, La Reunion, and Argentina. Omega was found to be a satisfactory Loran-A replacement, with adequate signal strengths and geometries in most areas evaluated. (Author)

Karkalik, F Wischmeyer, E
Systems Control, Incorporated Final Rpt. FAA-RD-77-65, Aug. 1975, 278 pp

Contract DOT-FA75WA-3662

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041095/1ST

16 166470
A FLIGHT INVESTIGATION OF SYSTEM ACCURACIES AND OPERATIONAL CAPABILITIES OF A GENERAL AVIATION AREA NAVIGATION SYSTEM

Flight tests were conducted at the National Aviation Facilities Experimental Center (NAFEC) using a general aviation area navigation (RNAV) system to investigate system accuracies and resultant airspace requirements in the terminal area. Issues investigated were total system error and error budget, flight technical error, turn anticipation, waypoint storage capacity, and results of typical operational maneuvers. Subject pilots for the test represented two distinct levels of experience. Subjects were also restricted to a one-, two-, or three-waypoint storage capacity for various flights. Statistical data are presented for the various error components making up the RNAV total system error. Various operational capabilities were also investigated and graphical data are presented for parallel offsets and turn anticipation. A two standard deviation of or-1.5 nmi was measured for total system crosstrack error in the terminal area. (Author)

Edmonds, JD Pursel, RH Gallagher, J
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-43, FAA-NA-77-1, June 1977, 99 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A042846/6ST

16 169169
A STUDY OF STANDARDIZATION METHODS FOR DIGITAL GUIDANCE AND CONTROL SYSTEMS. ADVISORY REPORT

This report contains an investigation of the standardization of methods for digital guidance and control systems, particularly with regard to data transmission techniques and high level programming languages. It includes discussion of the general problems and techniques, reports on the particular experiences of the individual nations, and concludes that, whilst much work

remains to be done on software aspects, the field of data transmission may be amenable to early standardization. The annexes to the report contain full details of the techniques studied, and include comparisons of data transmission methods and high level languages. These comparisons are not intended as quantitative assessments but are designed to outline the relevant features of the different techniques.

NATO Furnished.

Schweizer, GE Callaway, AA Gangl, EC Vandecasteele, B Bloom, JN
Advisory Group for Aerospace Res & Dev-NATO AGARD-AR-90, May 1977, 555 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A044915/7ST

16 169184
PILOTED FLIGHT SIMULATOR STUDY OF LOW-LEVEL WIND SHEAR, PHASE 2

Task 2 of the All-Weather Landing Systems project is concerned with piloted flight simulation tests of various techniques designed to aid the pilot to detect and cope with low-level wind shear on approach and landing. This report documents the tests of Phase 2, a comparative evaluation of the most promising panel-displayed techniques from the Phase 1 study. The operational situation of a DC-10 aircraft landing in Category I visibility with ILS guidance was simulated. Winds corresponding to inversion-layer, frontal, thunderstorm and "no-shear" conditions were simulated to provide test profiles. The "baseline" aiding concept was the conventional DC-10 manual approach management. The aiding concepts tested were based on ground speed displays (first experiment), flight path angle (second), and modified (acceleration-augmented) flight director (third experiment). The results showed that ground speed displayed on the airspeed indicator and the modified flight director can improve performance significantly over baseline, especially on the thunderstorm wind profiles, which was the most difficult condition.

Gartner, WB Ellis, DW Foy, WH Keenan, MG McTee, AC
SRI International Intrm Rpt. FAA-RD-77-157, Mar. 1977, 181 pp

Contract DOT-FA75WA-3650

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047251/4ST

16 169187
INITIAL COLLISION AVOIDANCE ALGORITHMS FOR THE BEACON-BASED COLLISION AVOIDANCE SYSTEM

This document describes a set of baseline collision avoidance algorithms which can be used as a point of departure for the development of final algorithms for the FAA's Beacon-based Collision Avoidance System (BCAS). The algorithms were structured to permit great flexibility in an experimental environment such as NAFEC. They incorporate a number of selectable options in the collision avoidance logic and in the display output. One option permits the selection of either a passive mode logic or an active mode logic. When the passive mode is selected, other options allow horizontal positive or negative commands to be used. In addition, the display of positive or negative commands can be selected or suppressed, and limit vertical rate commands can be selected for display independently of positive or negative commands. Two types of Intruder Position Data (IPD)-flashing IPD's and ordinary IPD's-can also be selected for display. The logic can drive three types of cockpit displays namely, an ACAS display, a baseline IPC display, and a general purpose Plan View Display (PVD). (Author)

Clark, J McFarland, AL
Mitre Corporation FAA-RD-77-163, MTR-7532, Apr. 1977, 96 pp

Contract DOT-FA69NS-162

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047254/8ST

16 169566
AERONAUTICAL FREQUENCY ASSIGNMENTS NEAR CABLE TELEVISION CARRIER FREQUENCIES

The report contains lists and geographical locations of aeronautical radio stations operating near frequencies commonly used for visual, aural, or pilot carriers by cable television systems. These lists are provided to assist cable television system operators in determining whether they must adjust their frequencies or take other action to comply with FCC rules (Section 76.610 and 76.611) prohibiting cable use of certain frequencies in case of conflict with aeronautical radio use of those frequencies.

Paper copy available on subscription, North American Continent price $36.00/year; single copy price PC$10.50, MF$3.00; all others write for quote.

Federal Communications Commission 1978

ACKNOWLEDGMENT: NTIS
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NTISUB/D/239

16 172707
FLIGHT INSPECTION PACKAGES AND INTERFACE PROBLEMS

The necessity to perform aerial inspection of ground based navigation aids has been established beyond doubt. The adequacy of equipment available to perform this mission is not as clearly defined. Problems encountered over several years of direct experience are illustrated with the conclusion that end-users may have purchased products that will not meet flight inspection requirements. The major areas of concern in providing a total FIS package are the airframe, the primary radios, and the support equipment. Console design is complicated by the necessity of interfacing with numerous airframe configurations. A need exists to coordinate the efforts of airframe manufacturers, black-box suppliers, and installers to provide safe dependable systems capable of performing the intended mission.

Prepared for SAE Meeting, 29 March-1 April 1977.

Lorenzen, AI (Rockwell International)
Society of Automotive Engineers Preprint SAE 770448, 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 172723
DIGITAL DATA BROADCAST: AN AID TO AREA NAVIGATION

Preliminary analysis has indicated that a Digital Data Broadcast System (DDBS) concept could be applied as a potential solution to the problems of cockpit workload, pilot blunders, and airborne data storage. The basic philosophy of the program described in this paper was to evaluate concurrently both the operational impact of the DDBS concept under a set of flight evaluations and the technical feasibility of a DDBS engineering model. The principal conclusion of this program substantiates and amplifies the original goals of the DDBS development effort, namely, a reduction of cockpit workload, pilot blunders, and steering errors.

Richardson, DW (Champlain Technology Industries) Hughes, M Elliott, RA *Journal of Aircraft* Vol. 14 No. 6, June 1977, pp 533-539, 6 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 172810
STUDY TO DETERMINE THE CHARACTERISTIC SHAPES OF HELICOPTER VISUAL APPROACH PROFILES

Prior to this study, the characteristic shape of visual approach profiles had not been formally documented. In this study, over 200 visual approaches were flown using different helicopter types, test subjects, and initial conditions, and the altitude and groundspeed profiles were measured by a precision tracking radar. The data from each approach were then processed, and the characteristic shape of the altitude, groundspeed, and deceleration profiles was determined for each set of initial conditions. These flight data were processed further using graphical analysis techniques and parameterization which, in turn, led to developing closed-form equations that accurately describe the characteristic groundspeed and deceleration profiles. Results from this study can be used to select instrument approach profiles, to develop instrument approach control laws, and to define the corresponding hardware requirements.

Moen, GC (Army Air Mobility Research & Development Lab) DiCarlo, DJ Yenni, KR *American Helicopter Society, Journal of* Vol. 22 No. N2, Apr. 1977, pp 12-20, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 173085
GUIDANCE LOGIC FOR SPIRAL APPROACHES
A spiral approach concept is proposed as a standard procedure for independent, commercial VTOL operations conducted in close proximity to CTOL operations. A guidance logic is developed for this VTOL application, although the results may be applicable to curved approaches by STOL or CTOL aircraft as well. The guidance concept attempts to maintain constant airspeed along a fixed-radius nominal spiral. The presence of wind requires a continuous variation in bank angle and heading rate to remain on the desired path. Linear perturbation analysis is used to select satisfactory feedback gains for commanded bank angle, longitudinal acceleration, and vertical speed.

Hollister, WM (Massachusetts Institute of Technology) Hoffman, WC *Journal of Aircraft* Vol. 14 No. 10, Oct. 1977, pp 972-980

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 173091
RECONFIGURABLE REDUNDANCY MANAGEMENT FOR AIRCRAFT FLIGHT CONTROL
A highly fault-tolerant digital computer system has been configured based on extensive experience with flight-proven redundant digital flight control systems. The feasibility of minimizing hardware complexity is shown while maintaining high levels of fault tolerance. The emerging hardware design combines reconfiguration concepts with conventional hardware redundancy techniques and special operational software to provide dual fail operate performance with a basic triplex system. The design provides high reliability and flight safety, enhances maintainability, and reduces life cycle cost while offering improved performance for future aircraft.

Bosch, JA (General Electric Company) Kuehl, WJ *Journal of Aircraft* Vol. 14 No. 10, Oct. 1977, pp 966-971, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 173479
INTEGRITY IN FLIGHT CONTROL SYSTEMS
With the increased use of electronic flight-control systems for better aircraft performance and cost-effectiveness, development and test techniques which can insure the integrity of such systems have become critically important. Rapid advances in solid-state electronics have permitted a hundred-fold decrease in control computer size, power and cost the past two decades. Designers have capitalized on these gains primarily by incorporating additional control functions to improve aircraft capabilities. Resulting control systems have become very complex and reliability requirements have mushroomed. A summary is presented of the evolution of these requirements, outlines the current status of flight control reliability, and highlights promising methods of achieving integrity in future flight control systems.

Proceedings of the Joint Autom Control Conf, San Francisco, 22-24 June 1977.

Kurzhals, PR (National Aeronautics and Space Administration) Deloach, R
Institute of Electrical and Electronics Engineers Proceeding Vol. 1 No. 77CH 1220-3CS, 1977, pp 489-497, 17 Ref.

ACKNOWLEDGMENT: EI
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16 173484
OSIRIS--A DISTRIBUTED FAULT-TOLERANT CONTROL SYSTEM
OSIRIS is an Onboard Survivable Integrated Redundant Information System, being developed for a variety of control applications, and in particular for commercial transport aircraft. The system elements include a fault-to-tolerant multiprocessor, a damage-and fault-tolerant network, distributed local processors, and operational software for fault detection, identification, and recovery for the entire system. This article briefly describes the kinds of applications for which OSIRIS is intended, the architecture of the system and the precepts that have guided its development, and the current status of the experimental configuration.

Presented at the 14th IEEE Computer Society Intl Conference, San Francisco, 28 Feb-3 March 1977.

Hopkins, AL, Jr (Massachusetts Institute of Technology) Smith, TB, III
Institute of Electrical and Electronics Engineers Proceeding 1977, pp 279-282, 4 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 173486
SYLEDIS, A RADIOPOSITIONING SYSTEM
A pulse radiopositioning system, designated SYLEDIS, has been developed, which does not rely on radar techniques. The use of compression of long pulses by correlation methods, and of a carrier wave in the 420-450 MHz band, has resulted in a highly accurate system, insensitive to soil conductivity, exhibiting no ambiguity problem, capable of ranges of 2 or 3 times the line of sight, and not limited by obstacles of reasonable size. SYLEDIS is highly flexible and operates in the range or hyperbolic modes.

AGARD Conf Proc, n 209: Propag Limitations of Navig and Positioning Syst, Presented at the Electromagn Wave Propag Panel Spec Meet, Istanbul, Turkey, Oct 20-22 1976.

Laurent, P Nard, G
Advisory Group for Aerospace Res & Dev-NATO Proceeding Feb. 1977, 21 pp, 4 Ref.

ACKNOWLEDGMENT: EI
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16 173700
HUMAN FACTORS CONSIDERATIONS IN ESTABLISHING AIRCRAFT COLLISION AVOIDANCE SYSTEM ALERT THRESHOLDS
This paper discusses considerations that bear on the effectiveness of the pilot's use of collision avoidance alerts. The paper suggests that the human factors involved in the operational use of a collision avoidance system are as important in establishing alert thresholds as are the purely mathematical measures of false alert rate and late alert or missed alert rates. Collision avoidance commands are expected to occur infrequently. Consequently, the pilot's success in using his collision avoidance equipment to avoid a hazardous mid-air encounter depends upon his performance in a moment of surprise, and upon the attitude that he has developed toward this equipment prior to the time of the alert. The difficulties of assessing the human factors of collision avoidance systems under realistic conditions are discussed. Data from past experiments with collision avoidance systems, and operational experience with stall warning devices and the ground proximity warning system are reviewed. The advantages of conducting an operational flight test evaluation of a collision avoidance system before committing that system to implementation are discussed. /Author/

McFarland, AL (Mitre Corporation) *SAFE Journal* Vol. 8 No. 1, 1978, pp 9-13

ORDER FROM: SAFE Association, P.O. Box 631, Canoga Park, California, 91393

16 173702
NO LF AIRWAYS, MORE AREA NAV SEEN IN FUTURE AIRSPACE PLAN
This article summarizes the recommendations concerning development of canadian airspace by 1986 contained in a Department of Transport report entitled "Canadian Airspace Capability Plan--1977-1986". The actions proposed include: a reduction in the complexity of airspace designations (from 35 to 5); elimination of Controlled Visual Flight rules; a requirements that all aircraft operating in certain areas carrying operating transponders; the phasing out of low frequency airways become available; the increasing use of Area Navigation (RNAV) techniques; the provision of more direct pilot/controller VHF communications facilities' and the upprobing of training syllabic and standards for VFR pilot licencing.

Flight Plan Vol. 51 No. 3, Mar. 1978, p 18

ORDER FROM: MacLean-Hunter Limited, 481 University Avenue, Toronto, Ontario M5W 1A7, Canada

16 174319
ELECTRONIC INTEGRATED PILOT DISPLAY IS EVALUATED IN NORTH SEA OPERATIONS
An electronic integrated pilot display manufactured by Kaiser Aerospace and Electronics has been under operational evaluation in a Sikorsky S-61N

helicopter operated by KLM Noordzee Helikopters B. V. since November 1975. This instrument, using a cathode ray tube as a display device, combines the data from all instruments normally scanned by the S-61 pilot during instrument takeoffs and landings. It is installed in place of the conventional artificial horizon in the right-hand instrument panel. Modes of operation under evaluation include instrument takeoff (adaptive to aircraft gross weight and density altitude), cruise, and approach modes.

van der Harton, RJ (KLM Helikopters, Netherlands) Cooper, PG
Vertica Vol. 1 No. 4, 1977, pp 271-279, 8 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

16 175298
MICROWAVE SCANNING BEAM LANDING SYSTEM, GROUND STATION: PERFORMANCE TEST REPORT. VOLUME 1: EXECUTIVE SUMMARY
Conclusions and recommendations are presented based on data evaluation as developed to date and detailed in Engineering Test Summary Reports.

Cutler-Hammer Incorporated NASA-CR-151582, Aug. 1977, 17 pp

Contract NAS9-14543

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-14021/7ST

16 175530
SURVEYS OF ELECTROMAGNETIC FIELD INTENSITIES NEAR REPRESENTATIVE HIGHER-POWER FAA TRANSMITTING ANTENNAS
The National Bureau of Standards has completed surveys of electromagnetic field intensities near the antennas of typical FAA transmitters. These include aircraft radars, ground surveillance radars, instrument landing systems, navigation equipment and communication antennas. The surveys were made with rf radiation monitors having isotropic response patterns. Commercial monitors with thermocouple sensors were used to measure electric fields between 0.5 and 24 GHz and magnetic fields between 10 and 300 MHz. Probes designed at NBS with diode detectors were used for electric field between 100 kHz and 10 GHZ. These radiation monitors cannot measure (accurately) the pulse-peak field of a radar nor the field of a scanning antenna; therefore, most of the radar surveys involved fixed antennas. The intensity in the direct beam of air route surveillance radars was greater than 10 mW/sq.cm. at distances within about 14 meters from the antennas. The intensity of airport surveillance radars was above 10 mW/sq.cm. at distances within 15 meters, except for the newer ASR-8 model. The direct beam of aircraft radars exceeded 10 mW/sq.cm. at distances ranging from 2 to 7 meters. If the time-averaging effect for antenna scanning is taken into consideration, these field values would be greatly reduced. Also, the near-zone beams of FAA antennas are not normally accessible to personnel. In accessible areas the measured fields were generally less than 1 mW/sq cm. (Author)

Larsen, EB Shafer, JF
National Bureau of Standards Final Rpt. FAA-RD-77-179, NBSIR-76-849, Dec. 1977, 115 pp

Contract DOT-FA73WAI-388

ACKNOWLEDGMENT: NTIS
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AD-A051717/7ST

16 175536
MICROWAVE LANDING SYSTEM INTRA-AIRCRAFT EMC ANALYSIS
This report discusses the electromagnetic compatibility of the Time-Reference Scanning-Beam Microwave Landing System (MLS) with other radiating systems on-board nine types of aircraft. These nine aircraft are the McDonnell Douglas DC-10, DC-9, DC-8, Boeing 747, 737, 727, 707, Lockheed Tristar L-1011, and the North American Rockwell T-39 Sabreliner. This MLS intra-aircraft interference analysis was performed by calculating the interference power level at a receiving antenna, comparing this power with a user-specified interference threshold, and identifying the potential problems. This report considers the TRSB MLS design as it was at the time the study was completed. Since that time a number of design changes have been made and are not addressed in this report. (Author)

Gawthrop, PE
Electromagnetic Compatibility Analysis Center Final Rpt. FAA-RD-77-109, ECAC-PR-76-006, Mar. 1976, 46 pp

Contract DOT-FA70WAI-175

ACKNOWLEDGMENT: NTIS
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AD-A052063/5ST

16 176124
CONTINUED INVESTIGATION OF POTENTIAL APPLICATION OF OMEGA NAVIGATION TO CIVIL AVIATION
Major attention is given to an analysis of receiver repeatability in measuring OMEGA phase data. Repeatability is defined as the ability of two like receivers which are co-located to achieve the same LOP phase readings. Specific data analysis is presented. A propagation model is described which has been used in the analysis of propagation anomalies. Composite OMEGA analysis is presented in terms of carrier phase correlation analysis and the determination of carrier phase weighting coefficients for minimizing composite phase variation. Differential OMEGA error analysis is presented for receiver separations. Three frequency analysis includes LOP error and position error based on three and four OMEGA transmissions. Results of phase amplitude correlation studies are presented.

Baxa, EG
Research Triangle Institute NASA-CR-145307, RTI-4378-1009-F, Mar. 1978, 207 pp

Contract NAS1-13290

ACKNOWLEDGMENT: NTIS
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N78-18028/8ST

16 176228
ECONOMIC ANALYSIS OF FUTURE CIVIL AIR NAVIGATION SYSTEMS
This report updates and consolidates the economic analyses of three previous FAA/METREK studies related to future domestic air navigation. Subsequent to the writing of one of these reports, which demonstrated the benefits of VORTAC modernization, the Airway Facilities Service (AAF) made significant revisions to both the F/E and O/M cost estimates for VORTAC modernization. The FAA also updated its estimate of distribution of VOR and DME among the general aviation population. This report documents the impact of these changes. There are no significant changes to both LORAN-C and GPS avionics cost estimates at this time. The study shows *that there is no cost advantage in replacing the present* VOR/DME system unless more stringent needs, such as area navigation, coverage and accuracy become necessary. Based on the estimated avionics costs the results show that the total cumulative costs (discounted at 10%) to the user plus government, for the various alternatives studied from the year 1985-2010, range from $695 million for VOR/DME, and $865 million for LORAN-C, to $970 million for GPS. It is further shown that if either LORAN or GPS ever become the primary air navigation system, then keeping the VOR for general aviation for a lengthy transition period would be economically attractive. (Author)

Joglekar, AN Seiler, K, III
Mitre Corporation Final Rpt. FAA-EM-78-6, Dec. 1977, 35 pp

Contract DOT-FA78WA-4075

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A054474/2ST

16 176229
AN EVALUATION OF MODIFIED RNAV TERMINAL PROCEDURES USING A SINGLE-WAYPOINT RNAV SYSTEM
Nine pilots participated in a series of flight simulation tests employing solo pilot techniques which were conducted at the National Aviation Facilities Experimental Center (NAFEC) in order to measure Total System Crosstrack (TSCT) and Flight Technical Error (FTE) using a single-waypoint area navigation (RNAV) system. The tests were designed to assess pilot performance as a function of routes and route structures (consisting of different combinations of waypoints and/or intersections). Performance was measured on the variables: horizontal tracking and procedural performance. The horizontal tracking data included both steady state and transition data.

Eldredge, D Goldberg, B Crimbring, W
National Aviation Facilities Experimental Center Final Rpt.
FAA-RD-78-27, FAA-NA-77-49, Apr. 1978, 120 pp

ACKNOWLEDGMENT: NTIS
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AD-A054510/3ST

16 176628
MICROWAVE LANDING SYSTEMS

Despite steady improvements in the VHF/UHF Instrument Landing System (ILS)--the international standard for the last three decades--higher-frequency, alternative landing systems have proliferated. For the military, microwave landing systems offer, among other advantages, the ability to provide compact, mobile equipment. ILS employs antennas with apertures as large as 100 feet; at Ku-band (about 15 GHz), the same performance can be obtained with 3-4 foot aperture antennas. For civil aviation, landing systems operating at lower microwave frequencies are contending to replace ILS as the International standard. A key distinction among proposed microwave landing systems and the present standard is how each uses RF and higher-frequency energy to determine aircraft position. ILS employs fixed overlapping beams, whereas most military systems employ a narrow scanning beam that is encoded with angular position. Among the entries contending for international standardization, Doppler MLS determines angular position from the apparent Doppler shift from a reference frequency caused by a signal that is sequentially switched down a linear array of radiators, in contrast with Time-Reference Scanning Beam MLS, which measures the time difference between the to-fro passages of horizontal and vertical scanning beams. /Author/

Poqust, F *IEEE Spectrum* Vol. 15 No. 3, Mar. 1978, pp 30-36

ACKNOWLEDGMENT: IEEE Spectrum
ORDER FROM: ESL

16 177432
IMP-16 HELPS SMALL PLANES FLY A STRAIGHT COURSE

At present, pilots zigzag across country from one station in the very-high-frequency omnirange navigation network to the next, for lack of equipment powerful enough to compute a direct route in real time yet small enough to fit in their general-aviation airplanes. The article describes a microprocessor called the IMP-16 which performs in real time all the calculations necessary for manual or automatic flight control making it possible for the pilot to fly straight to his destination.

Tsolis, S *Electronics* Vol. 50 No. 12, June 1977, pp 147-150

ACKNOWLEDGMENT: EI
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16 177434
MIRA: THE MULTIFUNCTION INERTIAL REFERENCE ASSEMBLY

A potential solution to spiraling avionics cost is the development of a Multifunction Inertial Reference Assembly (MIRA). A description is given of the basic concepts of MIRA and the advantages inherent with this approach across the entire life of a system. Preliminary results of several of the technical efforts being accomplished for MIRA are included.

IEEE Proceeding of the National Aerospace Electron Conference, NAECON '77, Dayton, Ohio, May 17-19, 1977.

Harrington, EV, Jr (Air Force Avionics Lab) Bell, JW Raroja, GH Institute of Electrical and Electronics Engineers Proceeding 77CH1203-9 NAECON, 1977, pp 783-787, 5 Ref.

ACKNOWLEDGMENT: EI
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16 178469
PRINCIPLES AND SIMULATION OF JTIDS RELATIVE NAVIGATION

The time-synchronous operation and high accuracy time-of arrival (TOA) measurement capability of Joint Tactical Information Distribution System (JTIDS) terminals makes possible a high performance relative navigation (RELNAV) function through addition of only software in the terminal's computer program. The principles of operation, the basic observation equations, and the system architecture for both absolute (geographic) and relative navigation are described. Sequential passive ranging by means of the TOA measurements, in conjunction with appropriate source selection logic and a recursive (e.g., Kalman) filter mechanization are employed to determine the user's position, velocity, and time bias. The filter algorithms and error sources, the software functional flow, and some simulation results are presented.

Fried, WR (Hughes Aircraft Company) *IEEE Transactions on Aerospace & Electronic System* Vol. AES No. 1, Jan. 1978, pp 76-84, 17 Ref.

ACKNOWLEDGMENT: EI
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16 179392
NAVIGATION PLANNING--NEED FOR A NEW DIRECTION

This report deals with the proliferation of navigation systems and their mounting costs to the Government and users. Of the 13 systems the General Accounting Office reviewed, only 4 and parts of a 5th system were thought to be needed in the future because the military NAVSTAR satellite development has the potential for meeting the navigation needs of nearly all users. Substantial savings may be possible by deferring the spending for systems which NAVSTAR could replace. It is noted that a Government-wide navigation plan is needed to reduce the proliferation and overlap of navigation systems. Also, a strong management focus is needed to plan and direct Government-wide navigation matters. The Congress should question future requests for expenditures on navigation systems which may not be needed in later years and allow funds only when they can be cost/benefit justified or on the specific basis of safety or combat readiness. The Congress also may have to decide whether a civil or military agency should eventually manage the NAVSTAR navigation satellite system. GAO recommends that the President assign to a single manager the responsibility and authority to direct the development and implementation of a Government-wide navigation plan. Until such a plan is developed and accepted, GAO recommends that the Secretaries of Defense and Transportation defer unnecessary spending for the unneeded navigation systems as long as NAVSTAR remains their potential replacement.

A Report to the Congress.

General Accounting Office LCD-77-109, Mar. 1978, 107 pp

ACKNOWLEDGMENT: General Accounting Office
ORDER FROM: General Accounting Office, P.O. Box 1020, Distribution Section, Washington, D.C., 20013

17 165243
CRITICAL ASSESSMENT OF STUDIES RELATING WHOLE-BODY VIBRATION TO PASSENGER COMFORT
This paper critically reviews the major work which has been carried out over the past 40 years to investigate the relationship between whole-body vibration and comfort. Although a fair amount of work has been completed in this area, this review demonstrates that the majority is unacceptable from most practical standpoints although some concordance exists. Finally, the paper shows that attempts which have been made to draw the field together (including an International Standard) to produce curves of equal comfort have not significantly increased our knowledge of how people react to whole-body vibration.

Oborne, DJ (Swansea University College, Wales) *Ergonomics* Vol. 19 No. 6, Nov. 1976, pp 751-774, 64 Ref.

ACKNOWLEDGMENT: EI
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17 166066
PROFILES OF INTERNATIONAL PASSENGERS AT U. S. AIRPORTS-1976
Summary data on passenger traffic between the United States and foreign countries are provided for the Calendar Year 1976. Data were selected from Form I-92, 'Aircraft/Vessel Report' of the U. S. Immigration and Naturalization Service. Statistics include passenger origin and destination ports, the nationality of the carriers, and the number of U.S. and Non-U. S. citizens on each flight. International operations -both departures and arrivals-by U. S. airport are also included. Passenger flows are broken down by geographical regions, domestic and foreign carriers. Number of passengers carried between each of 66 U. S. ports and individual world countries is displayed in tables by world areas. Charts depict for each of the U. S. airports total passengers on U. S. and foreign carriers, on all Flags and U. S. and foreign carriers with percentages of U. S. and Non-U. S. citizens. Data are by world region with an All Ports summary. The total U. S. international traffic operating out of all U. S. ports is distributed among ten Foreign World Areas. International travel to and from the Caribbean, Bermuda and Canada is not included in this study. (Author)
Availability: Microfiche copies only.

Federal Aviation Administration FAA-AVP-77-27, Apr. 1977, 277 pp

ACKNOWLEDGMENT: NTIS
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AD-A041304/7ST

17 166205
SHORT HAUL AIR PASSENGER DATA SOURCES IN THE UNITED STATES
The sources and characteristics of existing data on short haul air passenger traffic in the United States domestic air market are described along with data availability, processing, and costs. Reference is made to data derived from aircraft operations since these data can be used to insure that no short haul operators are omitted during the process of assembling passenger data.

Al-kazily, J Gosling, G Horonjeff, R
California University, Berkeley NASA-CR-152671, ITS-SR-76-1, June 1977, 174 pp

Grant NSG-2127

ACKNOWLEDGMENT: NTIS
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N77-22054/9ST

17 167209
PROCEEDINGS AND FINDINGS OF THE 1976 WORKSHOP ON RIDE QUALITY
The workshop was organized around the study of the three basic transfer functions required to evaluate and/or predict passenger acceptance of transportation systems. These are the vehicle, passenger, and value transfer functions. For the purpose of establishing working groups corresponding to the basic transfer functions, it was decided to split the vehicle transfer function into two distinct groups studying surface vehicles and air/marine vehicles, respectively.
Subm-Sponsored by NASA. Conf-Proc. Held at Fairlee, VT., 13-15 Oct. 1976.

Kuhlthau, AR
Virginia University NASA-CP-2006, Dec. 1976, 86 pp

Contract DOT-AS-60060
ACKNOWLEDGMENT: NTIS
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N77-27710/1ST

17 167516
INTERCITY PASSENGER MODAL SHIFTS AS AN ENERGY CONSERVATION OPTION
This report deals with the study of various policies which effect energy savings in intercity passenger movement. Presently ninety-nine percent of all fuel consumed in intercity passenger travel is by auto and air modes. FEA is concerned with studying the regulatory, modernization, operational efficiencies and intermodal shifts which have potential for energy savings. This paper deals with the strategies for mode shifts. Two corridors-North East and California are studied and results documented. Twenty two scenarios (eighteen individual strategies and four combinations) were modeled for the 1982 time frame. Individual strategies include: Adjustments of air fares through regulatory or tax actions; Rail and Bus fare reductions; Auto cost increases; Rail and Bus block time improvements; Reduced auto availability; and reduced air service frequency. Results of various strategies studied are well documented.
Proceedings of the Third National Conference (Conf-760895), Effects of Energy Constraints on Transportation Systems, Union College, Schenectady, New York, August 2-6,1976.

Bowles, RL (Federal Energy Administration)
Department of Energy May 1977, pp 323-335, 5 Fig.

ACKNOWLEDGMENT: Department of Energy
ORDER FROM: GPO

GPO 060-000-00073-5

17 167958
THE FUTURE OF PASSENGER TRANSPORT IN EUROPE
[L'avenir des transports de voyageurs en Europe]
A report on passenger transport requirements between large European urban areas. There are four volumes: Steering Committee report giving a brief description of the study conducted and an interpretation of its results; report of the Project Group which describes the transport networks of all the various modes, gives intermodal split and traffic demand models and outlines development strategy; one volume of appendices; and one volume of maps. [French]

Organization for Economic Cooperation and Devel May 1977, p 940, 2 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006

17 169047
INFLUENCE OF THE JOURNEY'S TIME OF DAY ON THE DE-AND RESYNCHRONIZATION OF THE 24-HOUR RHYTHM OF BODY TEMPERATURE AFTER TRANSATLANTIC FLIGHTS
The influence of a time-shift of 6 hours on the 24-hour rhythm of body temperature was investigated in a group of eight students in Germany and the U.S.A. by measuring their rectal-temperatures after transatlantic flights. The temperatures were taken continuously over the first six days and on days 8 and 13 after an east-west flight and after a west-east flight. In contrast to previous studies in which the west flight was day-flight, the east flight a night-flight, both flights in this case were day-flights. The time of resynchronization after the east-west flight ran up to seven days, the time after a flight in the opposite direction up to ten days. This result squares with the results gained from previous experiments on day and night flights in so far as an influence of the hour of the day, at which the flight is carried out, is not supposed.
Misc-Report Will Also Be Announced as Translation (Esa-TT-420). In German; English Summary.

Sonderfeld, AT
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft PhD Thesis DLR-FB-77-10, Mar. 1977, 48 pp

ACKNOWLEDGMENT: NTIS
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N77-30740/3ST

17 169054
EFFECTS OF INTERIOR AIRCRAFT NOISE ON SPEECH INTELLIGIBILITY AND ANNOYANCE
Recordings of the aircraft ambiance from ten different types of aircraft were used in conjunction with four distinct speech interference tests as stimuli to determine the effects of interior aircraft background levels and speech intelligibility on perceived annoyance in 36 subjects. Both speech intelligibility and background level significantly affected judged annoyance. However, the interaction between the two variables showed that above an 85 db background level the speech intelligibility results had a minimal effect on annoyance ratings. Below this level, people rated the background as less annoying if there was adequate speech intelligibility.

Pearsons, KS Bennett, RL
Bolt, Beranek and Newman, Incorporated Final Rpt. NASA-CR-145203, Aug. 1977, 67 pp

Contract NAS1-14463

ACKNOWLEDGMENT: NTIS
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N77-29918/8ST

17 169228
A NATIONAL NETWORK DATA BASE SYSTEM
The report documents a data base system created at the National Bureau of Standards. The National Network Data Base System (NNDBS) provides information on flows of freight and passengers throughout the transportation system of the United States. It consists of a set of Fortran programs written for the NBS Univac 1108 (but transportable) and some basic data tapes. In addition to providing basic data on the transportation network, the NNDBS can produce modal splits, aggregations over certain zones in the U.S., and is capable of easy extension to other uses. The report is intended as a user's guide and includes discussions of the data tapes and each of the programs. Complete listings and tape formats are also included.

Supported in part by the Office of the Secretary of Transportation, Washington, D.C., and the Office of the Chief of Engineers (Army), Washington, D.C.

Jackson, RHF
National Bureau of Standards, Office of the Secretary of Transportation, Department of the Army, (NBS-2050405/6) Final Rpt. NBSIR-75-911, Sept. 1975, 61 pp

ACKNOWLEDGMENT: NTIS
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PB-274629/5ST

17 169578
VALIDATION OF THE PASSENGER RIDE QUALITY APPARATUS (PRQA) FOR SIMULATION OF AIRCRAFT MOTIONS FOR RIDE-QUALITY RESEARCH
The NASA passenger ride quality apparatus (PRQA), a ground based motion simulator, was compared to the total in flight simulator (TIFS). Tests were made on PRQA with varying stimuli: motions only; motions and noise; motions, noise, and visual; and motions and visual. Regression equations for the tests were obtained and subsequent t-testing of the slopes indicated that ground based simulator tests produced comfort change rates similar to actual flight data. It was recommended that PRQA be used in the ride quality program for aircraft and that it be validated for other transportation modes.

Bigler, WV
Virginia University NASA-CR-154892, Apr. 1977, 69 pp

Contract NGR-47-005-181

ACKNOWLEDGMENT: NTIS
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N77-31785/7ST

17 170202
MODE SHIFT STRATEGIES TO EFFECT ENERGY SAVINGS IN INTERCITY TRANSPORTATION
The major goals of this study were to determine the extent to which intercity travelers could be induced to shift from highly energy consumptive to more energy efficient travel modes, and to identify means of inducing such mode shifts which would save significant amounts of energy without at the same time causing a severe deterioration in transportation services. The short-haul transportation of intercity travelers in two high-density areas, namely the Northeast and California corridors, were analyzed, and a group of strategies were considered which were expected to shift travelers to energy efficient modes. Associated regulatory and institutional issues were also examined. A major concern of this study is the reaction of the traveling public to qualitative transportation system changes. A methodology for predicting increased or reduced demand caused by the imposition of a strategy was developed, as well as a detailed data base on modal energy consumption characteristics. The study noted a correlation between energy conservation and total demand reduction which is indicative of the hazards of arbitrary adoption of federal policies. It was also noted that significant fraction of the total consumption is associated with the air mode.

Aerospace Corporation Final Rpt. Apr. 1977, 82 pp, Figs., Tabs., Refs., 6 App.

17 170829
REVEALED VALUE OF TIME IN AIR TRAVEL
The author demonstrates a new revealed preference approach to evaluating time, and uses this method to obtain estimates of the value of time in air travel. Shows that the full price demand functions may be obtained from demand theory, and the restrictions on these demand functions provide an indirect means of estimating the value of time. This value is estimated from air travel data, via the indirect procedure developed, from other demand studies. The author reaches conclusions as to the effect of flat rate far increases in various markets.

Devany, A *Review of Economics and Statistics* Vol. 56 No. 1, Feb. 1974, pp 77-82, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: Harvard University Press, Cambridge, Massachusetts, 02138

17 170843
SUBSTANTIAL IMPAIRMENT OF THE NORTH ATLANTIC PASSENGER MARKET
The effects of charter airline operations on scheduled air services on the North Atlantic route are discussed here in terms of the impairment of regular, dependable and frequent schedules, the maintenance of low density routes and schedule flexibility. This paper seeks to define and provide a greater understanding of the term substantial impairment, as it is likely to affect the policy decisions of the agencies controlling North Atlantic air traffic.

Browne, W (Oregon State University) *Logistics and Transportation Review* Vol. 10 No. 4, 1975, pp 363-369, Tabs., Refs.

ACKNOWLEDGMENT: European Conference of Ministers of Transport
ORDER FROM: British Columbia University, Canada, Vancouver V6T 1W5, British Columbia, Canada

17 170854
IMPACT OF TRANSPORTATION IMPROVEMENTS: EFFECTS ON TRAFFIC OF THE SHORT-TAKE-OFF-AND LANDING AIR ROUTE IN THE COUNTY OF FINNMARK [Ringvirkninger av transporttiltak: trafikale virkninger av kortbane flyruta i Finnmark]
The report describes the first effects on traffic of the short-take-off-and landing airroute in Finnmark, which was opened in August 1974. The results are based upon an interview-investigation among the passengers on the airline in autumn 1974. Of the effects registered were: the transportation offer was improved, approximately 2-3 of the passengers were inhabitants of the country, 60 per cent travels within the area for the airline. The pattern of contact is changed within the area influenced by the new air route. [Norwegian]

Boelkesjdoe, T Brandsaether, P
Transportoekonomisk Institutt June 1975, 113 pp

ACKNOWLEDGMENT: European Conference of Ministers of Transport

17 173500
NUMBER OF PASSENGERS ARRIVING IN AND DEPARTING FROM SWEDEN BY MODES OF TRANSPORT 1970-76 [Antal passagerare till och fraan sverige foerdelade efter anvaent transporsaett 1970-76]
The number of passengers arriving from abroad (excl the number of passengers passing the Norwegian and Finnish frontiers by bus or passenger car) during 1976 amounted to 20 million, of which by sea 17,7 million, by

air 2,2 million, by railway passing the Norwegian and Finnish frontiers 0,2 million. The number of passengers leaving for abroad (excl the number of passengers by bus and by passenger cars passing the Norwegian and Finnish frontiers during 1976 amounted to 19,5 million, of which by vessel 17,2 million) by air 2,2 million and by railway passing the Norwegian and Finnish frontiers 0,2 million. [Swedish]

Statistiska Centralbyran, (0082-0334) Analytic No. T1977:14, 1977, 7 pp, 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 229670), National Swedish Road & Traffic Research Institute

17 173559
MASS TRANSPORTATION ALTERNATIVES: AIR, HIGHWAY, BUS AND RAIL
This article explains where we are today concerning mass transportation. It takes an in-depth look at the past, present and future projections of passenger traffic by discussing the interstate highway, rail, air, and bus systems. It outlines transportation needs in both urban and rural areas, as well as discussing problems which will need to be solved in order to make mass transportation a viable alternative to the private automobile.
Preprint for meeting held August 8-11, 1977.

Smith, PA
Society of Automotive Engineers Preprint SAE 770679, Aug. 1977, 8 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

17 173688
ORIGINS AND DESTINATIONS OF PASSENGERS AT UNITED KINGDOM AIRPORTS
This report presents the 1972 survey results for the first time in detail and, together with results of the 1970 and 1971 surveys, presents an overall picture of passenger movements in the United Kingdom for 1972. The underlying theme of the surveys was to find out passengers' origins/destinations in the United Kingdom. The 1970 survey included data analysis on transportation used to and from airports, the number of people meeting and seeing off the passengers, and income ranges. The 1971 survey included the time taken and routes used to get to and from the airport. The 1972 survey included additional questions on the length of time that tickets had been booked, the size of the travel party, income, age, and family structure. From these surveys it is possible to examine how the London area airports have changed between 1968 and 1972, in numbers of passengers and in their make up.

Civil Aviation Authority, England CAP 363, June 1975, 103 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: Civil Aviation Authority, England
ORDER FROM: Civil Aviation Authority, England, Space House, 43/59 Kingsway, London WC2B 6TE, England

17 173841
THE STATE-OF-THE-ART IN AIR TRANSPORTATION DEMAND AND SYSTEMS ANALYSIS: A REPORT ON THE PROCEEDINGS OF A WORKSHOP SPONSORED BY THE CIVIL AERONAUTICS BOARD, DEPARTMENT OF TRANSPORTATION, AND NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
The proceedings reported here are segmented into 6 sessions: the role of government agencies on aviation; issues of concern to airport authorities; forecasting as perceived by the airline companies; the activities of the financial community in the airline industry; issues in the quantity and quality of air transportation data; and the role of the aircraft manufacturers in the forecasting process. The government agencies panel discussed the price elasticity of air travel demand and the variations in methodology and results of forecasting. Areas for future research were identified. The importance of forecasting the demand for travel in conjunction with the impacts of socioeconomic, political and environmental issues was stressed by the panel of airport authorities. The panel on forecasting in the air carrier industry emphasized the need for a better understanding of the underlying behavioral traits for the forecasting of demand and other factors in order to monitor the intricate patterns of change that will occur in future aviation activities. The financial community panel noted that the critical question of the future pertains to: what additional information analysis can the financial community use to more effectively serve the airlines and the air transport system. The panelists representing the CAB discussed the wide variety of data collected and published by the board for general use by the public. The final panel focused on future research needs and requirements in the aviation industry as perceived by the U.S. aircraft manufacturers.

Taneja, NK Kneafsey, JT
Massachusetts Institute of Technology R-75-7, Aug. 1975, 20 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

17 173842
PROCEEDINGS OF THE WORKSHOP: AIR TRANSPORTATION DEMAND AND SYSTEMS ANALYSIS
The proceedings reported here are segmented into 6 classes. The first panel on the role of government agencies on aviation included papers on the following: elasticities of air transport; aviation forecasts and forecasting methodology; aviation economics; demand estimation as a factor in R&D program planning; and the role of the EPA in regulating aircraft/airport noise. The second panel on the issues of concern to airport authorities included papers on the need for an integrated approach to data collection; ground access--the key to airport development; items of importance to the future of airports; and basic airport data assembly, storage and access for planning and operational use. Papers by the panel on forecasting as perceived by the airline industry covered research needs by the airfreight system, the identification of service and the contributions of air transportation to the economy, fares/cost and short haul air transportation, and commuter airlines. The activities of the financial community in the airline industry was covered by papers in a fourth panel. The panel on issues in the quantity and equality of air transportation data covered financial and traffic data, O&D and service segment data, international traffic forecasting and air transportation data activities. The role of aircraft manufacturers in the forecasting process was covered in the last panel which included, among others, papers on surplus seat management.

Massachusetts Institute of Technology R75-8, Aug. 1975, 486 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

17 173858
PROFILES OF SCHEDULED AIR CARRIER PASSENGER TRAFFIC FOR TOP 100 US AIRPORTS, AUGUST 6, 1976
This report provides data for passenger traffic on scheduled air carrier services departing from and arriving at the top 100 airports within the fifty states and the District of Columbia. Enplanement and deplanement data are displayed by class of service by hour of the day for Friday, August 6, 1976. The selection of the top 100 airports was based on the total number of 1973 passenger enplanements in domestic and international service.

Transportation Systems Center FAA-AVP-77-30, July 1977, 201 pp, Tabs.

ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Office of Aviation Policy, Washington, D.C., 20591

17 174331
RIDE TECHNOLOGY APPLICATIONS TO LARGE PASSENGER AIRCRAFT
The needs for appropriate passenger aircraft ride technology are twofold. First, what are the best means for designing acceptable passenger ride and, second, what are the criteria for satisfactory passenger ride. This paper presents the status of aircraft ride technology in terms of these twofold needs and cites current weaknesses for use in achieving a goal of cost effective passenger ride.
ASME AMD V24, 1977: Passenger Vib in Transp Veh, presented at DesEng Tech Conf, Chicago, Illinois, 26-28 September 1977.

Brumaghm, SH (Boeing Company) McKenzie, JR
American Society of Mechanical Engineers Proceeding 1977, pp 73-85, 18 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

17 174574
THE DEVELOPMENT OF A MODEL FOR PREDICTING PASSENGER ACCEPTANCE OF SHORT-HAUL AIR TRANSPORTATION SYSTEMS
Meaningful criteria and methodology for assessing, particularly in the area of ride quality, the potential acceptability to the traveling public of present and future transportation systems were investigated. Ride quality was found

to be one of the important variables affecting the decision of users of air transportation, and to be influenced by several environmental factors, especially motion, noise, pressure, temperature, and seating. Models were developed to quantify the relationship of subjective comfort to all of these parameters and then were exercised for a variety of situations. Passenger satisfaction was found to be strongly related to ride quality and was so modeled. A computer program was developed to assess the comfort and satisfaction levels of passengers on aircraft subjected to arbitrary flight profiles over arbitrary terrain. A model was deduced of the manner in which passengers integrate isolated segments of a flight to obtain an overall trip comfort rating. A method was established for assessing the influence of other links (e.g., access, terminal conditions) in the overall passenger trip.

Kuhlthau, AR Jacobson, ID
Virginia University NASA-CR-145250, 18, Sept. 1977, 59 pp

Contract NGR-47-005-181

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33148/6ST

17 175001
AN INVESTIGATION OF RIDE QUALITY RATING SCALES

An experimental investigation was conducted for the combined purposes of determining the relative merits of various category scales for the prediction of human discomfort response to vibration and for determining the mathematical relationships whereby subjective data are transformed from one scale to other scales. There were 16 category scales analyzed representing various parametric combinations of polarity, that is, unipolar and bipolar, scale type, and number of scalar points. Results indicated that unipolar continuous-type scales containing either seven or nine scalar points provide the greatest reliability and discriminability. Transformations of subjective data between category scales were found to be feasible with unipolar scales of a larger number of scalar points providing the greatest accuracy of transformation. The results contain coefficients for transformation of subjective data between the category scales investigated. A result of particular interest was that the comfort half of a bipolar scale was seldom used by subjects to describe their subjective reaction to vibration.

Dempsey, TK Coates, GD Leatherwood, JD
Langley Research Center NASA-TP-1064, Nov. 1977, 48 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-11696/9ST

17 176740
ORIGIN-DESTINATION SURVEY OF AIRLINE PASSENGER TRAFFIC, INTERNATIONAL/TERRITORIAL

The Civil Aeronautics Board, in cooperation with the U.S. certificated route air carriers, has conducted a recurrent passenger origin-destination survey presenting statistics on passenger travel via the scheduled services of these carriers and showing passenger trip origin and destination and volume of traffic by routing in terms of carriers and transfer points. This survey includes passenger journeys in which one or more of the points in the itinerary lie outside of the 50 U.S. states and in which a U.S. certificated route air carrier performed all or part of the transportation.

Formal authorization from CAB is required for access to these data.

Civil Aeronautics Board Vol IX-3-41, 3rd Qrt, 1976, 11 pp, 17 Tab.

ACKNOWLEDGMENT: Civil Aeronautics Board

17 176741
ORIGIN-DESTINATION SURVEY OF AIRLINE PASSENGER TRAFFIC, DOMESTIC

The Civil Aeronautics Board, in cooperation with the certificated route air carriers and the Air Transport Association of America, has conducted a recurrent passenger origin-destination survey presenting statistics on passenger travel via the scheduled services of the U.S. certificated route air carriers and showing passenger trip origin and destination and volume of traffic by routing in terms of carriers and transfer points. The certificated route air carriers collect survey data on the basis of a continuous 10-percent sample of passenger tickets according to instructions prescribed by the CAB. This survey includes passenger journeys in which all of the points in the itinerary lie within the 50 U.S. states.

Civil Aeronautics Board, Air Transport Association of America Vol IX-4-1, 4th Qrt, 1976, 20 pp, 13 Tab.

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Air Transport Association of America, 1709 New York Avenue, NW, General Accounting, Washington, D.C., 20006

17 176908
PASSENGER TRANSPORTATION IN NORTH AMERICA, AIR VERSUS GROUND

The author presents a review of the usage of different travel modes in North America supported by statistical evidence from the years 1970 to 1974. Rail, road and air travel are analyzed in turn and comparisons made with equivalent systems in Europe. 90 per cent of passenger-kilometres are accounted for by the car and the remaining 10% split between air, rail and bus, is dominated by air. The bus is identified as having the greatest potential as yet unrealized. STOL is briefly mentioned and suggestions made for possible new modes of travel and intermodal systems. This paper was presented to the 15th anglo-american aeronautical conference in London, June 1977 (paper no 512/18).

Hanchet, WHD (Transport Canada Research and Development Centre)
Aeronautical Journal Anaiytic Vol. 82 No. 805, Jan. 1978, pp 33-37, 8 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-231757)
ORDER FROM: ESL

18 151579
EXPOSURE OF AIRPORT WORKERS TO RADIATION FROM SHIPMENTS OF RADIOACTIVE MATERIALS. A REVIEW OF STUDIES CONDUCTED AT SIX MAJOR AIRPORTS

The radiation exposure of airport workers handling shipments of radioactive materials was studied at six airports. Descriptions were obtained of the handling and arrangement of the packages, dose distributions were mapped around groupings of packages, and doses received by workers were evaluated both on the basis of time-motion studies and through readings of personal monitoring devices. Results of dosimeters worn over extended periods indicated that no workers were expected to receive exposures in excess of 500 millirems per year and most were expected to receive less than 100 millirems per year. No evidence was found in any of the six airport studies to suggest that members of the public received any exposure of significance relative to the natural background radiation.

Shapiro, J
Harvard University, Nuclear Regulatory Commission Techn Rpt. NUREG-0154, Feb. 1976, 32 pp

Contract NUREG-DR-75-1505

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-262211/6ST

18 158461
CONTROLLER PRODUCTIVITY IN THE UPGRADED THIRD GENERATION AIR TRAFFIC CONTROL SYSTEM. PART II: AUTOMATION IN THE DATA LINK ERA

This document is part two of two reports which were p. pared to provide the latest estimates of the expected increase in productivity of enroute and terminal area air traffic controllers, due to the implementation of the Upgraded Third Generation control system. Part 2 addresses improvements in the data link era. The benefits due to the implementation of these automation programs are discussed in detail and transformed into dollar savings. (Author)

See also Part 1, AD-A034 527.

Keblawi, FS
Mitre Corporation Final Rpt. FAA-EM-76-3-2, MTR-7319, Aug. 1976, 71 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A038133/5ST

18 166067
GENERAL AVIATION PILOT STALL AWARENESS TRAINING STUDY

The objective of this study was to determine the weaknesses of present flight training syllabi, the methods of training used, and the flight instruction presently provided in the stall/spin area; conceive an experimental stall/spin increment to an established flight and ground training syllabus; and conduct flight and ground test evaluations of this syllabus change and the flight instruction techniques required. Results indicate that additional ground training in the subject of stalls and spins, additional flight training on stall awareness, and/or intentional spin training would all have a positive influence toward reducing inadvertent stalls and spins.

Hoffman, WC Hollister, WM
Aerospace Systems, Incorporated Final Rpt. FAA-RD-77-26, ASI-TR-76-37, 7609, 265 pp

Contract DOT-FA75WA-3716

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A041310/4ST

18 166097
U. S. CIVIL AIRMEN STATISTICS

The U.S. Civil Airmen Statistics is an annual study published to meet the demands of FAA, other government agencies, and industry for more detailed airmen statistics than those published in other FAA reports. Statistics pertaining to airmen, both pilot and nonpilot, were obtained from the official airman certification records maintained at the FAA Aeronautical Center, Oklahoma City, Oklahoma.

Federal Aviation Administration 1976, 34 pp

ACKNOWLEDGMENT: NTIS
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AD-A041568/7ST

18 167076
REVIEW OF PILOT AND CONTROLLER ATC RESPONSIBILITIES

Recent aviation accidents have raised significant questions concerning a lack of mutual understanding between pilots and controllers regarding basic air traffic control (ATC) responsibilities for safe instrument flight. This study reviews these responsibilities and the methods by which they are: (1) established by operations and procedures (pilot/controller authority and the use of radar monitoring services); (2) reinforced through documentation and training; and (3) updated and improved by ATC system user communications. Specific recommendations are given that highlight key needs for FAA improvement.

Harris, RM
Mitre Corporation, Federal Aviation Administration MTR-6954, July 1975, 89 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-271228/9ST

18 169438
JOB ATTITUDES OF AIRWAY FACILITIES PERSONNEL

A total of 2,366 employees of the Airway Facilities (AF) Service responded to a detailed questionnaire concerning job satisfaction and such factors as salary, shift schedule, workload, and geographic location. In general, AF employees reported satisfaction with employment by the AF Service, particularly in the areas judged most important by them: salary, job security, independence and personal responsibility, and achievement. Dissatisfaction was focused on various aspects of working conditions, such as shift rotation, management effectiveness, promotion opportunities, and paperwork. Detailed analyses of responses as a function of such variables as age, grade level, location, and AF program were also presented. The findings were discussed in terms of the implications for improving the job-related attitudes of AF personnel. (Author)

Smith, RC Hutto, GL
Federal Aviation Administration FAA-AM-77-21, Aug. 1977, 87 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046412/3ST

18 169733
CHARACTERIZATION OF CURRENT TOWER CAB ENVIRONMENTS

This report describes the general tower cab environment in terms of: (a) the evolution of the tower cab, current cab classification and staffing levels, and the basic flow of ATC data relevant to cab operations, (b) a breakdown of functions performed by tower cab personnel, the basic equipment used to perform those functions, and allocation of equipment and responsibilities to various controller positions, and (c) current tower-related systems and procedures, including airspace surveillance, surface surveillance, flight data handling and the role of the flight progress strip, air/ground communications, the data processing and display systems, weather related systems, and current landing systems. The equipments covered included the Airspace Surveillance Radar (ASR), Brite Radar Indicator Equipment (BRITE), Airport Surveillance Detection equipment (ASDE-2), the NUBRITE display, Display Enhancement Unit (DEU), Flight Data Entry and Printout equipment (FDEP), basic radar PPI, TPX-42 automation and ARTS II and ARTS III displays, Runway Visual Range (RVR) and Runway Visual Value (RVV) equipment, various altimeters, etc.

Hobbs, VJ Clapp, DF Rempfer, PS Devoe, D Bellantoni, J
Transportation Systems Center Intrm Rpt. FAA-EM-77-10, TSC-FAA-77-19, Nov. 1977, 206 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A048306/5ST

18 170192
TIME-DELAY PROBLEMS ENCOUNTERED IN INTEGRATING THE ADVANCED SIMULATOR FOR UNDERGRADUATE PILOT TRAINING

An advanced Computer Image Generation (CIG) visual system has been integrated with an advanced Flight Training Research Simulator. The integration design was the first developed for integrating a CIG visual system with a sophisticated flight simulator. There was much concern for the unique CIG system transport delay, and techniques were developed which proved to be quite successful in compensating for the majority of this delay. However, not enough concern was given to previously unrecognized and unreported excessive motion system delays which were encountered during final integrated system tests. The integration scheme and the impact of iteration rates, visual and motion system delays, and delay compensation on visual and motion cue coordination as perceived by pilots are presented.

Gum, DR (Air Force Human Resources Laboratory) Albery, WB *Journal of Aircraft* Vol. 14 No. 4, Apr. 1977, pp 327-332

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 170193
EFFECT OF DISPLAY COLOR ON PILOT PERFORMANCE AND DESCRIBING FUNCTIONS

A study has been conducted with the full-spectrum, calligraphic, computer-generated display system to determine the effect of chromatic content of the visual display upon pilot performance during the landing approach maneuver. This study utilizes a new digital chromatic display system, which has previously been shown to improve the perceived fidelity of out-the-window display scenes, and presents the results of an experiment designed to determine the effects of display color content by the measurement of both vertical approach performance and pilot-describing functions. This method was selected to more fully explore the effects of visual color cues used by the pilot.

Chase, WD (Ames Research Center) *Journal of Aircraft* Vol. 14 No. 4, Apr. 1977, pp 333-342

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 172715
INFLUENCE OF CURRICULUM ON AEROSPACE DESIGN DECISIONS

Structural design decisions, materials selections, and the choice of analysis methods used in practice are derived from the engineer's education and experience. Details of two new aerospace structural technical elective courses; Composite Materials, and Crashworthiness, are presented to illustrate how new ideas may be introduced into the crowded aero engineering curriculum. Details of some courses in aero structures and materials are presented in the appendix. Close coordination between engineering educators and engineers in practice will result in improved course content, and better design decisions in the future.

Prepared for SAE Meeting, 29 March-1 April 1977.

Smith, HW (Kansas University)
Society of Automotive Engineers Preprint SAE 770454, 1977, 16 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 172761
FOOTPRINTS TO TOTAL TRAINING THROUGH SIMULATION

The achievements of the astronauts have proven beyond a doubt that training to proficiency on the most complex of tasks can effectively be accomplished using simulation. Thus there is every reason to be confident that training programs using methods, procedures, and hardware specifically designed to meet airline requirements and budget restrictions, can just as effectively accomplish total airline training through simulation. American Airlines responded to the challenge of the 1960s by developing a training system that produced an unparalleled record for safety both in training and operations. At the same time our efforts toward the "total training through simulation" concept reduced training cost, saved fuel, conserved air space, and cut down on pollution. In today's world of fuel shortages, crowded skies, and unstable airline income, performance must equal the challenge.

Brown, JA (American Airlines Flight Academy) *Shell Aviation News* No. 439, 1977, pp 13-17

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 172771
PILOT WORKLOAD DURING STEEP GRADIENT APPROACHES

A flight trial to evaluate different approach profiles and techniques, using a BAC VC-10, is described. Pilot's heart rates were measured which, together with subjective opinions, were used to assess levels of workload. Most of the experimental approaches and landings were flown by two test pilots though other pilots participated briefly in the trial. The types of approach investigated included single segment with gradients up to and including 6 one-half degrees, 5 degree /3 degree two-segment with an intersection height of 500ft, 5 degree/3 degree two-stage flares and 3 degree low drag approaches. Evidence is presented to show that 5 degree/3 degree two-segment approaches do not cause significantly higher heart rates than do conventional 3 degree approaches.

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976.

Roscoe, AH (Royal Aircraft Establishment)
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper 25, Jan. 1977, 10 pp, 5 Ref.

ACKNOWLEDGMENT: EI
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18 172785
INNOVATION AND THE CHANGING ROLE OF THE ENGINEER

Innovation has two aspects: (1)Material, which results in the introduction of new products or processes; and (2)theoretical, which results in new methodology. Both aspects of innovation are examined with reference to civil engineers in the aerospace industry, and the design of aircraft. It is shown, by referring to a number of econometric analyses, that material innovation obtained through research and development has contributed greatly to American economic growth. Historical examination of the finite element method of structural engineering, which arose in the aerospace industry, raises some important questions about the future role of engineers. In particular, whether or not the engineer, through his use of the computer, may indeed be moving into some of the traditional fields of activity of the scientist, as the preceding historical analysis would seem to indicate, and if such forecasting should prove to be valid, whether this will influence the future education of the engineer.

King, WJ (Texas A&M University) McDonald, D *ASCE Journal of Transportation Engineering* Vol. 103 No. 3, May 1977, pp 409-419, 64 Ref.

ACKNOWLEDGMENT: EI
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18 172789
INDIVIDUAL DIFFERENCES IN PILOT PERFORMANCE

Decision-making performance in contingency situations is seen as a potentially fruitful area for study of individual differences, although information on the relative roles of experience and cognitive abilities, styles, and strategies are needed in all research areas. Approaches to studying pilot decision-making processes are discussed, with emphasis given to the wrong-model approach in which accident and incident data, or "process tracing" provide experimental computational structures. Analysis of data from a simulator experiment on V/STOL zero-visibility landing performance suggests that the order or ranking of individual pilot's effectiveness varies with particular situations defined by combinations of tracking requirements (e.g., glide slope, localizer) and glide-slope segment, or speed requirements; the data are being further analyzed.

Congress of the Intl Ergonomics Assoc, 6th, and Tech Program of the Annual Meeting of the Human Factors Society, 20th, Proceedings, University of Maryland, College Park, July 11-16, 1976.

Murphy, MR (Ames Research Center) *Human Factors* Proceeding 1976, pp 403-409, 30 Ref.

ACKNOWLEDGMENT: EI
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18 173080
AIAA VISUAL AND MOTION SIMULATION CONFERENCE, PROCEEDINGS, 1976
The volume contains 22 papers that cover mainly the application of the advanced visual aids for training of pilots. The topics covered include the systems for training of both flying and combat missions.

AIAA Visual and Motion Simul Conf, Proc, Dayton, Ohio, April 26-28-76.

American Institute of Aeronautics and Astronautics Proceeding 1976, 153 pp

ACKNOWLEDGMENT: EI
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18 173081
AWAVS: AN ENGINEERING SIMULATOR FOR DESIGN OF VISUAL FLIGHT TRAINING SIMULATORS
The Navy's Aviation Wide Angle Visual System (AWAVS) is designed to improve visual system technology and define hardware performance requirements for training. A description is given of the visual system hardware capabilities being developed for the initial carrier takeoff and landing configuration of AWAVS. The display system provides a composite image of two TV channels. The background TV channel is a low-resolution wide-angle display of sky and seascape. The target TV channel's narrow field of view presents a high-resolution carrier image for insertion into the displayed background channel. Each channel includes high-performance perspective image generation, distortion correction, and visibility effects. In addition to establishing system feasibility, the system's variability will permit investigation of the effects of visual system parameters on pilot performance in a specific task environment.

Chambers, WS (Naval Training Equipment Center) *Journal of Aircraft* Vol. 14 No. 11, Nov. 1977, pp 1060-63, 3 Ref.

ACKNOWLEDGMENT: EI
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18 173095
STABILITY OF THE PILOT-AIRCRAFT SYSTEM IN MANEUVERING FLIGHT
A control-theoretic pilot model is incorporated in the analysis of pilot-aircraft motions during maneuvers. The pilot model is found to be of value for the definition of maneuvering flight stabililty boundaries, and it simulates pilot control actions during a representative task with reasonable fidelity. The model also is used to demonstrate the consequences of improperly adapted pilot response strategy. It is concluded that the pilot model presented here provides important capabilities for evaluation of flying qualities and for identifying proper piloting procedures during difficult maneuvers.

Broussard, JR (Analytic Sciences Corporation) Stengel, RF *Journal of Aircraft* Vol. 14 No. 10, Oct. 1977, pp 959-965

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 174314
CHECKLISTS AND THE HUMAN FACTOR
The most effective protection against the possibly catastrophic effects of the normal variability of human performance, and normal human limitations, is the use of Standardised Operating Procedures and the unfailing use of a Checklist. It enables the crew member to shed some of the workload, thereby leaving more capacity available to deal with other matters requiring his expertise. If properly used it provides an assurance of continuity and completeness when essential crew duties are interrupted by ATC, by cabin staff, or other outside responsibilities.

Hawkins, F *Shell Aviation News* No. 442, 1977, pp 20-22

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 174564
STRESS FACTORS ON PILOT PERFORMANCE (A BIBLIOGRAPHY WITH ABSTRACTS)
The selected abstracts of research reports cover acceleration, circadian rhythms, physiology, psychology, neurology, man-machine systems, high altitude effects, noise effects, and vibration effects as related to stress factors on pilot performance. (This updated bibliography contains 163 abstracts, 31 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/1043, NTIS/PS-75/890, and NTIS/PS-75/033.

Harrison, EA
National Technical Information Service Bibliog. Dec. 1977, 168 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/1160/9ST

18 175002
ACTIVITIES OF THE DEPARTMENT OF AVIATION PSYCHOLOGY CONCERNING THE CONSULTANCY CONTRACT WITH THE DEUTSCHE LUFTHANSA AG JAHRESBERICHT 1974 DER ABT. [Luftfahrtpsychologie zum beratungsauftrag der Deutschen Lufthansa AG Jahresbericht 1974 der ABT]
Results of psychological aptitude tests for cockpit personnel selection for the Deutsche Lufthansa are reported for the period January through December 1974. An overall survey of these tests covering the past 20 years is also given.

Language in German.

Steininger, K Fichtbauer, S Goeters, KM Kirsch, H
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft Ann. Rpt. DLR-IB-355-75/01, 1976, 27 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-11698/5ST

18 175003
PSYCHOLOGICAL APTITUDE TEST OF AVIATION PERSONNEL FROM MALAWI [Psychologische Eignungspruefung von Luftfahrtpersonal aus Malawi]
Results of a series of tests for selection of 8 flight crew personnel from 32 applicants are reported. The jobs to be filled were those of navigator and mechanic onboard a Dornier Skyservant aircraft. The test battery used consisted mainly of culture fair tests, not taking into account knowledge of language and previous education.

Language in German.

Goeters, KM
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-355-75/03, 1975, 13 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-11699/3ST

18 175028
RESEARCH ACTIVITIES OF THE DFVLR DEPARTMENT OF AVIATION PSYCHOLOGY CONCERNING THE CONSULTANCY CONTRACT OF THE DEUTSCHE LUFTHANSA AG JAHRESBERICHT 1975 DER ABT. [Luftfahrtpsychologie zum Beratungsauftrag der Deutschen Lufthansa ag Jahresbericht 1975 der ABT]
Results of psychological aptitude tes.s for cockpit personnel selection of the Deutsche Lufthansa are reported for the period January 1975 through December 1975. Further development of the selection system is also discussed.

Language in German.

Steininger, K Adam, N Fichtbauer, S Goeters, KM Kirsch, H
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft Ann. Rpt. DLR-IB-355-76-01, 1976, 21 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-13741/1ST

18 175029
PSYCHOLOGICAL SELECTION OF APPLICANTS FOR A FLYING CAREER FLIEGERISCHE LAUFBAHN [Die Psychologische Auswahl von Bewerbern fuer die Fliegerische Laufbahn]
Tests for selection of a flight navigator, mechanic, and dispatcher, from applicants without prior training, are described. These tests are psychologically based in view of the considerable personal demands on trainees. It has been noted that after selection about 94% of the trainees successfully terminate the courses.

Language in German.

Kirsch, H
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-355-76-02, 1976, 16 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-13742/9ST

18 175030
SELECTION STRATEGY AND PSYCHOLOGICAL TESTS FOR APTITUDE INVESTIGATION OF APPLICANTS FOR PILOT TRAINING AT THE DEUTSCHE LUFTHANSA [Selektions-Strategie und Psychologische Tests bei der Eignungsuntersuchung von Bewerbern fuer die Fliegerische Ausbildung bei der Dlh]

Selection of applicants for pilot training at the Deutsche Lufthansa is described. This is carried out in several steps, the most important of which are preselection and interview. The preselection is objective and based on degree of aptitude, which results from weighing of separate test results covering cognitive tests, personality scales, and psychomotor tests. The next phase covers the applicant's personality. The last step is an evaluation of the applicant in the following categories: interactive performance, adaptation, stress resistance, and motivation.

Language in German.

Kirsch, H
Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-355-76-04, 1976, 20 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N78-13744/5ST

18 175527
DEVELOPMENT OF THE AVIATION STRESS PROTOCOL--SIMULATION AND PERFORMANCE, PHYSIOLOGICAL, AND BIOCHEMICAL MONITORING SYSTEMS

In development of the aviation stress protocol--simulation (ASPS), the following conclusions were reached: (1) In experiments using the ASPS, cardiovascular testing will be conducted in parallel, but separately; (2) The time of exposure to altitude will be limited to 2 h; and (3) Measurements such as visual accommodation, internal body temperature, blood glucose, blood drug or alcohol level, and others will be included in the ASPS only when appropriate. Cardiovascular and pulmonary parameters were assessed under simulated Gz and exercise conditions in normal males after exposure to the ASPS. Some parameters were displaced to a statistically significant degree, but such displacements are of doubtful physiological significance because of the unavoidable time lapse between altitude exposure and assessment. These preliminary experiments served to demonstrate that meaningful physiological assessments can only be made during exposure to the altitudes specified in the ASPS. Thirty-six controller subjects from previous stress studies were identified who subsequently suffered medical conditions severe enough to require waiver or retirement. These subjects' stress indices were compared with those of subjects who had no known pathology to see if any of the stress indicators were predictive of pathological conditions. The data showed that controllers who developed gastrointestinal pathology had significantly (p . 0.01) higher (c(st) than did their normal counterparts. At Miami ARTCC, c(ne) was significantly elevated (p . 0.05) in the cardiovascular group. (Author)

Three reports Relevant to Stress in Aviation Personnel.

Higgins, EA Lategola, MT Melton, CE
Federal Aviation Administration FAA-AM-78-5, Feb. 1978, 36 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A051690/6ST

18 176223
PSYCHOPHYSIOLOGICAL EFFECTS OF AGING-DEVELOPING A FUNCTIONAL AGE INDEX FOR PILOTS. II TAXONOMY OF PSYCHOLOGICAL FACTORS

One of the major objectives of gerontological aviation psychology is to determine the psychological variables, functions, abilities, skills, and factors that underlie, constitute or are associated with pilot performance and proficiency. They must be identified, analyzed, and measured if functional age is to be substituted for chronological age as a criterion for terminating an aviator's career. The approaches use consist of (a) the analysis of successful pilot behavior as displayed under simulated and operational conditions, (b) the analysis of unsuccessful pilot behavior (pilot error) as related to aircraft accidents, (c) the evaluation of pilot performance during the selection and training procedures as reported in the literature. By means of factor analyses, logical deductions, and clinical interpretations of the results obtained by various investigators, 14 factors are identified and described, namely (1) perception, (2) attention, (3) reaction, (4) orientation, (5) sensorimotor, (6) stamina, (7) cognition/mentation, (8) interpersonal relations, (9) decision making, (10) experience, (11) learning, (12) personality, (13) mechanical ability, and (14) motivation.

See also AD-A040 322.

Gerathewohl, SJ
Federal Aviation Administration FAA-AM-78-16, Apr. 1978, 76 pp

ACKNOWLEDGMENT: NTIS
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AD-A054356/1ST

18 176640
AUTOMATION IN CIVIL TRANSPORT AIRCRAFT

The pilot of a contemporary transport aircraft is in a managerial role, supervising the performance of sophisticated systems which perform most of the tasks concerned with operating the aircraft safely and efficiently. Under normal conditions he is required to exercise his psycho-motor skills only to a very small extent; his principal task is to process information and to convey instructions to the automatics by way of push-button switches and similar devices. In the event of major system failure, however, or in the absence of ground-based facilities, he may be called upon to take a much more active part in control. The evolution of flight-deck automation owes much more to engineering and economic analyses than to systematic development of policy concerning the role of men in automated systems. The current situation is not without its problems, and substantial ergonomics input should contribute to future developments.

Edwards, E (Aston University, England) *Applied Ergonomics* Vol. 8 No. 4, Dec. 1977, pp 194-198

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 176642
DETECTION BY PILOTS OF SYSTEM FAILURES DURING INSTRUMENT LANDINGS

The effects of gust disturbances and the pilot's participation mode in the control task on his work-load level and failure detection performance during a simulated low visibility landing approach are examined. It is found that the participation mode had a strong effect on the pilot's work load, the induced work load being lowest when the pilot acted as a monitoring element during a coupled approach and highest when the pilot was an active element in the control loop. The effects of differential work load and participation mode on failure detection are separated. The participation mode is shown to have a dominant effect on the failure detection performance, with a failure in a monitored (coupled) axis being detected significantly faster than a comparable failure in a manually controlled axis.

Ephrath, AR (Ames Research Center) Curry, RE *IEEE Transactions on Systems, Man and Cybernetics* Vol. SMC- No. 12, Dec. 1977, pp 841-848, 18 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 176644
EFFECTS OF COCKPIT ENVIRONMENT ON LONG-TERM PILOT PERFORMANCE

A fixed-base helicopter simulator was used to examine pilot performance as influenced by noise, vibration, and fatigue. Subjects flew the simulator for periods ranging between three and eight hours while exposed to vibrations (at 17 Hz) ranging from 0.1 to 0.3 g, and noise stimuli varying between 74 (ambient) and 100 dB. Despite reports of extreme fatigue on these long flights, subject performance did not degrade. Within the limits of this study, performance tended to improve as environmental stress increased. However, subjects did suffer from lapses resulting in abnormally poor performance. These lapses are probably of short duration (seconds) and occur at unpredictable times. If such lapses occur in actual flight, they could provide an explanation for many so-called "pilot error" accidents.

Stave, AM (Sikorsky Aircraft Division) *Human Factors* Vol. 19 No. 5, Oct. 1977, pp 503-514, 14 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 176653
PREDICTION OF PILOT OPINION RATINGS USING AN OPTIMAL PILOT MODEL

A brief review of some of the more pertinent applications of analytical pilot models to the prediction of aircraft handling qualities is undertaken. The term "handling qualities" as applied to piloted aircraft can be defined as "those qualities or characteristics of an aircraft that govern the ease and precision with which a pilot is able to perform the tasks required in support of an aircraft role". The relative ease with which multiloop piloting tasks can be modeled via the optimal control formulation makes the use of optimal pilot models particularly attractive for handling qualities research. To this end, a rating hypothesis is introduced which relates the numerical pilot opinion rating assigned to a particular vehicle and task to the numerical value of the index of performance resulting from an optimal pilot modeling procedure as applied to that vehicle and task. This hypothesis is tested using data from piloted simulations and is shown to be reasonable. An example concerning a helicopter landing approach is introduced to outline the predictive capability of the rating hypothesis in multiaxis piloting tasks.

Hess, RA (Ames Research Center) *Human Factors* Vol. 19 No. 5, Oct. 1977, pp 459-475, 28 Ref.

ACKNOWLEDGMENT: EI
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18 177002
FLIGHT INSTRUCTOR INSTRUMENT ROTORCRAFT-HELICOPTER WRITTEN TEST GUIDE

No Abstract.

Federal Aviation Administration 1977, 68 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

TD4.8/5:61-85

18 177003
PRIVATE PILOT AIRPLANE WRITTEN TEST GUIDE

No Abstract.

Federal Aviation Administration 1977, 112 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

TD4.8/5:61-32B

18 177004
OPERATIONS INSPECTION AND SURVEILLANCE PROCEDURES, AIR TAXI OPERATORS AND COMMERCIAL OPERATORS OF SMALL AIRCRAFT: COMMUTER AND V/STOL AIR CARRIER HANDBOOK

No Abstract.

Federal Aviation Administration Reprint 1977, 200 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

FAA 8430.1A

18 177422
AUTOMATED INSTRUCTIONAL SYSTEM FOR ADVANCED SIMULATION IN UNDERGRADUATE PILOT TRAINING (ASUPT)

The Advanced Simulation in Undergraduate Pilot Training (ASUPT) facility was designed as a research/experimentation tool for the U. S. Air Force Human Resources Laboratory (AFRHL). As such, it required an automated training system capable of supporting various research functions. This training system and its implications in both hardware and software are examined with special attention to the automated instructional provisions (AIP's).

IEEE Proceeding of the National Aerospace Electronics Conference NAECON '77, Dayton, Ohio, May 17-19, 1977.
Epps, R (Singer Company)
Institute of Electrical and Electronics Engineers Proceeding 77CH1203-9 NAECON, 1977, p 1212, 3 Ref.

ACKNOWLEDGMENT: EI
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18 179303
SPECIAL REPORT: AIRLINE LABOR

This special report on airline labor presents features and surveys providing general trends and examples of what is happening at specific airlines. Tabulated data on airlines and major unions indicates how sensitive the labor question is at many airlines throughout the world. A report on the U.S. National Mediation Board included an interview with the three members, a brief history of its decisions in airline matters, and an appraisal of the board's effectiveness from both both sides of the bargaining table. Also included are two features on the labor situation at British Airways and Eastern Airlines. A special feature on commuter airlines is presented. Major trends and observations from the surveys and feature articles indicate a rising unit labor cost; an even higher increase in total operating costs; minimal increase in employment; union membership has remained relatively static; commuter airlines are receiving more attention from unions than before; increasing pressure on airline management to related labor cost increases; and, airline management will continue to push for increased productivity by their employees.

Air Transport World Vol. 15 No. 6, June 1978, pp 18-42

ACKNOWLEDGMENT: Air Transport World
ORDER FROM: Reinhold Publishing Company, Incorporated, 600 Summer Street, Stamford, Connecticut, 06904

18 180134
THE ORGANIZATION OF WORK SCHEDULES FOR AIR TRAFFIC CONTROLLERS

A study of the alertness of 66 French air traffic controllers, based on a test of saccadio eye movements, is reported. The alertness levels determined by the experiment were found to show no significant correlation with the various work schedules of the air traffic personnel; however, the performance level did vary from day to night. Work schedules of air traffic controllers in other western European nations are also discussed. [French]

Nato, AGARD, Meeting, Scuola Militare di Sanita Aeronautica, Rome, Italy, Fegbruary 25, 1976.

Papin, JP (Centre d'Expert et Rech de Medecine Aeronaut, Fr) *Rivista di Medicina Aeronautica e Spaziale* Vol. 40 1977, pp 165-180

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-13515)
ORDER FROM: AIAA

A78-13515

18 180151
STRESS IN AIR TRAFFIC PERSONNEL-LOW-DENSITY TOWERS AND FLIGHT SERVICE STATIONS

Ten air-traffic control specialists at low traffic-density towers were monitored for stress and anxiety levels. The subjects ranged in age from 23 to 60 years old and included two female participants. The subjects were instrumented for ambulatory electrocardiography. Urine specimens representing both day and night periods were collected and analyzed for 17-ketogenic steroids, epinephrine, norepinephrine, and creatinine. Subjects were evaluated for psychological arousal states before and after each workday. Results are presented for mean heart rates, the stress indices at various facilities, mean A-Trait and A-State raw scores, and facility rank as obtained by urinary-metabolite indications of on-duty arousal.

Melton, CE Smith, RC McKenzie, JM Wicks, SM Saldfivar, JT *Aviation, Space and Environmental Medicine* Vol. 49 May 1978, pp 724-728

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-35111)
ORDER FROM: AIAA

A78-3511

18 180190
MONOCULAR VISION AND LANDING PERFORMANCE IN GENERAL AVIATION PILOTS: CYCLOPS REVISITED
Thirteen low-time, but current, private pilots flew 18 monocular landings (with an eyepatch placed over the non-dominant eye during the downwind leg) and 18 normal binocular landings. To assure equal effort under both conditions, pilots were told that they were in a spot landing contest with from 200 to 40 in prizes awarded on the basis of total accuracy on both monocular and binocular trials. No pilot was familiar with any prior research regarding monocular/binocular landing ability. Monocular landings were as accurate as binocular landings, but monocular approaches were flown higher/steeper, those landings tended to be longer and harder, the pilots judged them to be poorer, and they reported greater anxiety during the monocular landings. Evidence to date suggests that both high-time and low-time pilots can land as accurately monocularly (not better) but that monocular approaches and landings are flown differently.

Grosslight, JH (Florida State University, Tallahassee) Fletcher, HJ Masterton, RB Hagen, R *Human Factors* Vol. 20 No. 1, Feb. 1978, pp 27-33, 10 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 180191
REGULATION OF WORKING METHODS AS A FUNCTION OF WORK-LOAD AMONG AIR TRAFFIC CONTROLLERS
Attention is directed to processes involving reasoning, the receipt and transmission of information, and the division of tasks between controllers at the same station. The basic hypothesis, which is supported by numerous data, is that for a given task and a given controller certain operating procedures are less costly than others; that is, they generate lower levels of load. These procedures will therefore be more and more employed as work demand increases, together with the relaxation of certain, self-imposed, qualitative criteria. This regulatory feedback between work-load and operating methods is used by the controller to avoid the abrupt onset of overload conditions and to delay satiation. For the investigator, these progressive changes in operating procedure can provide indirect indices of load. Several ergonomic consequences of this approach for system design are discussed.

Sperandio, JC (Paris University, France) *Ergonomics* Vol. 21 No. 3, Mar. 1978, pp 195-202, 9 Ref.

ACKNOWLEDGMENT: EI
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18 180192
STRATEGY FOR THE DEVELOPMENT OF TRAINING DEVICES
This paper discusses the complex issues involved in the design of aircrew simulation training devices. It addresses methods for defining training requirements, fidelity, performance measurement, instructional features, and crew coordination. A research evaluation of a device using these methods is presented.

Cream, BW (Air Force Human Resources Lab, Wright-Patterson) Eggemeier, FT Klein, GA *Human Factors* Vol. 20 No. 2, Apr. 1978, pp 145-158, 23 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

18 180678
HAZARD EVALUATION AND TECHNICAL ASSISTANCE REPORT NO. TA 77-67, FEDERAL AVIATION ADMINISTRATION, O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS
A Hazard Evaluation and Technical Assistance survey was performed by NIOSH at the Federal Aviation Administration, O'Hare International Airport, Chicago, Illinois, acting on a request from OSHA in regard to alleged occupational health hazards at the air traffic control tower. A review of working conditions among air traffic controllers revealed several unresolved labor-management issues. A review of available medical data did not document the unusual occurrence of any specific medical problem, but claims of excessive somatic, psychiatric, and social dysfunction could neither be confirmed nor refuted. No specific occupational health hazard was identified, but the issue of whether the overall work environment constituted unacceptable stress could not be resolved. Recommendations are made for improved occupational health practices and for resolving work practices considered to be particularly stressful.

Singal, M
National Institute for Occupational Safety & Hlth NIOSH/TR/TA-77/67, Sept. 1977, 15 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-278796/8ST

19 117477
TRANSPORTATION SAFETY INFORMATION REPORT. JULY, AUGUST, AND SEPTEMBER 1977 QUARTERLY HIGHLIGHTS
The quarterly publication is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report is a discussion on Aircraft Postcrash Protection and an Intermodal Safety Affairs article on Occupant Protection Systems in various other modes.

See also NTISUB/C/224-002. Paper copy also available on subscription, North American Continent price $30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-TES-77-3, Dec. 1977, 80 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTISUB/C/224-003

19 141388
SEVERITIES OF TRANSPORTATION ACCIDENTS. VOLUME I-VOLUME IV
This study quantitatively describes the severities of the environments that small hazardous-material containers can be expected to experience in transportation accidents. These descriptions, which constitute an important component of the risk analysis of hazardous-material shipments, are necessary in determining the adequacy of protection provided by the uniquely designed shipping containers. In Volume I, significant results of the study are summarized; in Volume II, physical parameters of aircraft accident environments are discussed; and, in Volumes III and IV, truck and train accidents are examined.

Clarke, RK Foley, JT Hartman, WF Larson, DW
Sandia Laboratories SLA-74-0001, July 1976, 327 pp, 139 Fig., 67 Tab., 128 Ref.

Contract AT(29-1)-789

19 142041
INTERMODAL SAFETY RESEARCH NEEDS. REPORTS OF THE SIXTH WORKSHOP ON NATIONAL TRANSPORTATION PROBLEMS
This conference brought together DOT policymakers, university principal investigaters and other professionals to consider the intermodal safety research requirements of the Department of Transportation. The objectives of the conference were: To highlight safety problems and needed transportation safety research identified by DOT modal safety managers and to stimulate university or university/industry teams to respond with research proposals which emphasize multi-modal applicability and a system view. To provide a forum for university research groups to inform DOT safety managers of promising new directions in transportation safety research and new tools with which to address safety related problems. The conference addressed the research requirements for safety as identified by the Statement of National Transportation Policy and by the modal safety managers in three principal contexts, each a workshop panel: I-Inter-Institutional Problems of Transportation Safety. Problems were described as: Federal-State, local; Federal-Industry; Federal-Public, Consumer Groups. II- Goal Setting and Planning for Transportation Safety Programs. Issues were: modifying risk behavior, safety as a social value, and involving citizens in development of standards as a way of increasing probability of achieving program objectives. III-DOT Information, Management, and Evaluation Systems Requirements. Needs were: data requirements and analytic tools for management of safety programs.

This conference, held April 28-29 1976, was sponsored jointly by the Offices of University Research (TST-60) and Safety Affairs (TES-10), Office of the Secretary, DOT.

Warshawer, AJ
Office of the Secretary of Transportation, (DOT-TES-10/TST-60) Proceeding DOT-TST-76-77, Apr. 1976, 195 pp, Phots., 3 App.

ORDER FROM: NTIS
PB-271450/9ST

19 151801
TRANSPORTATION SAFETY ANALYSIS
A conceptual structure was developed for a model expressing transportation accident deaths as a function of transportation activity levels. The literature and data bases were reviewed. A first-level model was developed for the following modes: highway transport; air transport--scheduled and general aviation; and rail transport. The first-level model was used to project the number of transportation accident deaths, by mode, up to 1990, on the basis of transportation projections provided by TSC. An outline for a second-level model was developed.

Joksch, HC
Center for the Environment and Man, Incorporated, Transportation Systems Center Final Rpt. DOT-TSC-OST-76-24, CEM-4191-548, Nov. 1976, 150 pp

Contract DOT-TSC-1089

ACKNOWLEDGMENT: NTIS
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19 154328
EMERGENCY EVACUATION COMPUTER SIMULATION-PROGRAM DESCRIPTION AND USER'S GUIDE
A computer model has been developed that simulated emergency evacuation in transport category aircraft. Two computer programs are available that model wide and narrow body aircraft. The computer model is statistical in that a gamma function is assumed to obtain a probability distribution for time path segments of a passenger during evacuation. The program has been successfully run on a IBM 370/155 computer. Running time is dependent on the number of passengers and number of simulations run. Running time is approximately one minute for five evacuations of a 80 passenger narrow body aircraft. For 100 evacuations of a 389 passenger wide body aircraft running time is approximately 90 minutes. (Author)

Gillespie, J
Federal Aviation Administration Intrm Rpt. FAA-216-76A, Oct. 1976, 80 pp

ACKNOWLEDGMENT: NTIS
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AD-A036055/2ST

19 154717
J79-15/-17 TURBOJET ENGINE ACCIDENT INVESTIGATION PROCEDURES
This document should be of great benefit to the experienced accident investigator in conducting his accident investigation involving a J79 engine. It should enable an inexperienced investigator to conduct an accurate accident investigation by following the procedures described.

Distribution limitation now removed.

Ake, FK
Wright-Patterson, Aeronautical Systems Division, (AF-327C) Final Rpt. ASD-TR-75-19, Aug. 1975, 188 pp

ACKNOWLEDGMENT: NTIS
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AD-B007004/5ST

19 154984
AIR CARRIER CABIN SAFETY. A SURVEY
This is an overview report on the status and efficacy of the Federal Aviation Administration's air carrier cabin safety program. Up-to-date information on recurring cabin safety issues and problems was solicited from airplane manufacturers, air carriers, flight and cabin crews, associated organizations and others. The National Transportation Safety Board provided pertinent accident data and safety recommendations developed from aircraft accident investigation. The survey identifies significant recurring cabin safety operational problems including flight attendant training and protection, flammability of cabin interiors, toxicity and smoke generation during post-crash fires, emergency evacuation, survivability. Seventeen recommendations are presented for instituting actions by the FAA's Flight Standards Service, Office of Aviation Medicine and Office of Aviation Safety to resolve recurring cabin safety problems and for continuing long-term improvement of cabin safety.

Federal Aviation Administration Dec. 1976, 230 pp

ACKNOWLEDGMENT: NTIS
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AD-A037906/5ST

19 155070
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA, U.S. AIR CARRIER OPERATIONS, 1975

The publication presents the record of aviation accidents which occurred in all operations of the U.S. air carriers for calendar year 1975. It includes an analysis by class of carrier and type of service in which the 1975 performances were compared with 5-year base-period averages. All scheduled services of the certificated route carriers for the past 5 years (1971 through 1975) were compared with the previous 5-year period (1966 through 1970) for types of accidents and phases of operation. Statistical tables, which summarize the accidents, fatalities, and accident rates; causal tables; and briefs of accidents are presented in the appendixes.

National Transportation Safety Board NTSB-ARC-77-1, Jan. 1977, 98 pp

ACKNOWLEDGMENT: NTIS
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PB-264346/8ST

19 155075
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA, U.S. GENERAL AVIATION, CALENDAR YEAR 1975

The Annual Review of Aircraft Accident Data is a statistical compilation published by the National Transportation Safety Board. Statistical information has been compiled from reports of 4,237 general aviation accidents that occurred during the calendar year 1975. Included in the total number of accidents are 51 collisions between aircraft. By coding each aircraft involved in the collisions, an additional 51 records were produced, which brought total accident records to 4,288. This figure reflects that actual number of pilots and aircraft involved in the accidents.

See also PB-252 606.

National Transportation Safety Board NTSB-ARG-77-1, Jan. 1977, 200 pp

ACKNOWLEDGMENT: NTIS
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PB-264394/8ST

19 158485
FLIGHT LINE EXTINGUISHER EVALUATION

A two-phase test program was conducted to determine the optimum mechanical conversion of the FEU-1, CB-10 flight line fire extinguisher to enable it to utilize Halon 1211 (Bromochlorodifluoromethane) as the fire extinguishing agent instead of Chlorobromomethane (CB). Phase I tests included static discharges to determine the optimum nitrogen pressurization and fill ratios for both an internally pressurized and externally pressurized configuration. Tests were also conducted to screen the most effective nozzles from a group of about sixteen to evaluate further on live fires during Phase II. The first phase also included tests to determine the area of fire likely to occur when various amounts of jet (JP4) fuel are spilled on a hard, flat surface. Phase II included live fire tests using the nozzles, pressures and fill ratios selected as candidates in Phase I. After the completion of fire tests to determine the optimum combination of hardware using experienced operators, the effectiveness of the appliance in the hands of novice operators was also studied on simulated fuel spill fires as well as engine fires, tire fires, and three dimensional aircraft fires. Following the fire tests, the selected configurations were discharged after conditioning to tropic and arctic conditions to find out if the units were still operable and effective.

Chambers, GD
Aircraft Ground Fire Suppression & Rescue Off, DOD Final Rpt. DOD-AGFSRS-76-9, Jan. 1977, 93 pp

ACKNOWLEDGMENT: NTIS
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AD-A038380/2ST

19 158601
SAFETY OF TRANSPORT AIRCRAFT

The main subjects investigated are: investigations on accidents and incidents, operational considerations of the terminal control area (conventional landing and take-off procedures and proposals for modified and new procedures), analysis of the landing procedures by consideration of pilot handling, and proposals for improving the safety in the terminal control area.

Subm-Prepared Jointly with Dfvlr, Cologne. In German; English Summary.

Grieser, H Hertweck, HJ Keppeler, R Koehler, HJ Koehler, W
Dornier-System GmbH Final Rpt. BMFT-FB-W-76-07, Aug. 1976, 356 pp

Contract BMFT-LFF-27

ACKNOWLEDGMENT: NTIS
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N77-17019/9ST

19 159192
AVIATION SAFETY RESEARCH AND TRANSPORTATION/HAZARD AVOIDANCE AND ELIMINATION

Data collected by the Scanning Laser Doppler Velocimeter System (SLDVS) was analyzed to determine the feasibility of the SLDVS for monitoring aircraft wake vortices in an airport environment. Data were collected on atmospheric vortices and analyzed. Over 1600 landings were monitored at Kennedy International Airport and by the end of the test period 95 percent of the runs with large aircraft were producing usable results in real time. The transport was determined in real time and post analysis using algorithms which performed centroids on the highest amplitude in the thresholded spectrum. Making use of other parameters of the spectrum, vortex flow fields were studied along with the time histories of peak velocities and amplitudes. The post analysis of the data was accomplished with a CDC-6700 computer using several programs developed for LDV data analysis.

Sonnenschein, C Dimarzio, C Clippinger, D Toomey, D
Raytheon Company Final Rpt. NASA-CR-150208, ER76-4220, Aug. 1976, 54 pp

Contract NAS8-30795

ACKNOWLEDGMENT: NTIS
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N77-20047/5ST

19 159258
U.S. AIR CARRIER ACCIDENTS INVOLVING FIRE, 1965 THROUGH 1974 AND FACTORS AFFECTING THE STATISTICS

The study presents the statistical data on U.S. air carrier accidents involving fire from 1965 through 1974. The statistics are compared with data contained in Bureau of Safety Pamphlet (BOSP) 7-6-3, which treats the same subject for the years 1955 through 1964. The study concludes that there have been significant improvements in occupant survivability. While fire still occurs in about 20 percent of the accidents in scheduled passenger operations, the ratio of fatalities from all causes to exposed occupants has declined 65 percent in this study period and the ratio of fatalities from the effects of fire and smoke to exposed occupants has declined 37 percent. The almost exclusive use, in this study period, of turbojet-powered aircraft, their improved reliability, and the use of kerosene-type fuel are factors influencing the statistics. The anticipated upgrading of the Federal Aviation Regulations and the expected effects of the recently implemented requirements of 14 CFR 139 are expected to improve even further occupant survivability of accidents involving fire.

National Transportation Safety Board NTSB-AAS-77-1, Feb. 1977, 64 pp

ACKNOWLEDGMENT: NTIS
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PB-266883/8ST

19 159948
PERFORMANCE OF PLASTIC PACKAGING FOR HAZARDOUS MATERIALS TRANSPORTATION: PART I MECHANICAL PROPERTIES

This report, prepared for the U. S. Department of Transportation, contains background information useful in evaluating the performance of plastic packagings for hazardous materials transportation, insofar as mechanical properties are concerned. Current DOT regulations and test methods are reviewed, as well as testing procedures from other organizations and countries. Also included are recommendations to modify current DOT regulations to make test methods more quantitative. Finally, experimental data are presented which represent the initial stage of a study,it is hoped will

ultimately lead to the establishment of criteria upon which the long time behavior of plastic containers can be predicted based on short time tests.

Crissman, JM Guttman, CM Zapas, LJ
National Bureau of Standards, (NBSIR 76-1168 (R)) Final Rpt. DOT/MTB/OHMO-76/4, Oct. 1976, 45 pp, 5 Ref.

Contract DOT-AS-50074

ACKNOWLEDGMENT: DOT
ORDER FROM: NTIS

PB-270290/0ST

19 159949
PERFORMANCE OF PLASTIC PACKAGINGS FOR HAZARDOUS MATERIALS TRANSPORTATION PART II-PERMEATION
Permeation as a mode of failure for plastics packagings is discussed. The materials properties which determine permeation performance are defined. Measurement methods aimed at determining values for the materials properties are surveyed. A "matrix" scheme is introduced for evaluating the risks associated with the permeation failure of a package containing a hazardous materials lading. Permeation factors influencing reuse of plastic containers are described. Laboratory data from an evaluation of a simple method of test for estimating the intrinsic property of a lading to permeate polyethylene is presented.

Barnes, JD Martin, GM
National Bureau of Standards, (NBSIR 76-1163 (R)) Final Rpt. DOT/MTB/OHMO-76/5, Oct. 1976, 26 pp, 15 Ref.

Contract DOT AS-50074

ACKNOWLEDGMENT: DOT
ORDER FROM: NTIS

PB-270386/6ST

19 164930
FIRE CONTAINMENT TESTS OF AIRCRAFT INTERIOR PANELS
A program of experimental fires has been carried out to determine the effectiveness and usefulness of a burner to simulate various fire loads under different ventilation conditions in an enclosure of approximately similar dimensions as an aircraft lavatory module. The objective of the program was to develop fire containment criteria of aircraft interior panels such as burn-through time, rate of back face temperature rise, evaluation of selected combustible and toxic gases, heat flux rate, and other parameters that affect fire containment such as structural integrity.

Proceedings of the First Intl Conference on Fire Safety, San Francisco University, January 12-16, 1976.

Kourtides, DA (Ames Research Center) Parker, JA Leon, HA Williamson, RB Hasegawa, H Fisher, F Draemel, R Marcussen, WH Hilado, CJ
San Francisco University Press Conf Paper 1976, pp 137-154, 9 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 165961
A REVIEW OF PUBLICATIONS ON THE BIRD/AIRCRAFT STRIKE HAZARD
The annual cost to the United States Air Force (USAF) to replace or repair aircraft damaged by bird/aircraft collisions has led to an intensive study of the problems associated with birds on airfields and in the enroute environment. Since 1969 an active program has been in effect, first at the Air Force Weapons Laboratory (AFWL) at Kirtland Air Force Base, New Mexico, and in 1975 at the Air Force Civil Engineering Center (AFCEC), Tyndall Air Force Base, Florida. This report reviews those Technical Notes (TNs) and Technical Reports (TRs) that have been published as a result of the program effort. (Author)

Moorehead, AS McCracken, PR
Air Force Civil Engineering Center, (2103) Final Rpt. AFCEC-TR-76-21, July 1976, 26 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040212/3ST

19 166028
ANALYSIS OF SELECTED GENERAL AVIATION STALL/SPIN ACCIDENTS
An automated data search of existing general aviation data bases was employed in an effort to relate aircraft stall/spin accident history to general design characteristics. The technique employed utilized a chi-square analysis to evaluate a 9-year stall/spin history of 36 selected aircraft. The statistical analysis indicated that: accident rates are influenced by aircraft usage; accident rates are influenced by pilot experience; low-horsepower low-stall-speed aircraft have a higher propensity to stall/spin accidents; the highest incidence of stall/spin accidents was in the takeoff phase of flight; and with the exception of one aircraft type, the chi-square analysis did not identify specific aircraft designs or design categorizations which would have a higher propensity for stall/spin accidents, with all other factors (i.e., pilot experience, aircraft usage) constant.

Shrager, JJ
National Aviation Facilities Experimental Center Final Rpt. FAA-RD-77-41, FAA-NA-77-2, Feb. 1975, 91 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040824/5ST

19 166037
AN EPIDEMIOLOGIC INVESTIGATION OF OCCUPATION, AGE, AND EXPOSURE IN GENERAL AVIATION ACCIDENTS
This study involved a census of 4,491 general aviation accident-involved airmen records for the year 1974 to obtain relevant occupation, age, exposure, and other epidemiologic profile information of a descriptive nature. Population comparison data for occupation, age, and exposure were obtained from a sample of 9,414 currently certified airmen medical records as of December 1974. Occupation was studied under assumptions of similar exposure, total cumulative exposure by occupation, and recent exposure by occupation with the outcome under at least two methods of analysis being the identification of physicians, lawyers, sales representatives, farmers, and housewives as having high accident experience.

Federal Aviation Administration FAA-AM-77-10, Apr. 1977, 24 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A040978/9ST

19 166140
SEARCH AND RESCUE METHODS AND EQUIPMENT (A BIBLIOGRAPHY WITH ABSTRACTS)
Reports dealing with search and rescue on land and sea are presented. The majority of the citations cover sea search and rescue, although much is applicable to land search and rescue. Studies are included on search and rescue planning, location equipment, rescue beacons, communication devices, specialized aircraft and their components, searching strategies, as well as other equipment and techniques. Underwater rescue and survival are excluded. (This updated bibliography contains 166 abstracts, 72 of which are new entries to the previous edition.)

Supersedes NTIS/PS-76/0285.

Kenton, E Lehmann, EJ
National Technical Information Service June 1977, 173 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0498/4ST

19 166293
LISTINGS OF ACCIDENTS/INCIDENTS BY AIRCRAFT MAKE AND MODEL, U.S. CIVIL AVIATION, 1975, ACCIDENT REPORT
The publication contains a listing of all U.S. civil aviation accidents/incidents occurring in calendar year 1975, sorted by aircraft make and model. Included are the file number, aircraft registration number, date and location of the accident, aircraft make and model and injury index for all 4,431 accidents/incidents occurring in this period.

National Transportation Safety Board NTSB-AMM-77-1, Feb. 1977, 198 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-267644/3ST

19 166294
BRIEFS OF ACCIDENTS INVOLVING MIDAIR COLLISIONS, U.S. GENERAL AVIATION, 1975. ACCIDENT REPORT
The publication contains reports of U.S. general aviation midair collision accidents occurring in 1975. Included are 29 accident files, 13 of which involve fatal accidents. The brief format presents the facts, conditions, circumstances, and probable cause(s) for each accident. Additional statistical information is tabulated by kind of flying, phase of operation, injury index, aircraft damage, pilot certificate, injuries and causal factor(s).

National Transportation Safety Board NTSB-AMM-77-2, Feb. 1977, 48 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-267645/0ST

19 167003
WIND SHEAR CHARACTERIZATION
A brief review of the major causes of severe low-level wind shear indicates that the thunderstorm gust front is the most dangerous source of potential aircraft accidents. The study contains the analysis of several gust-front events in detail using meteorological tower, acoustic echo sounder, and pressure sensor data. The results were compared with theoretical models and laboratory studies. Analyses show that gust fronts can probably be detected reliably with a suitable array of different ground-based sensors. However, the determination of wind-shear severity is a more difficult problem. The results thus far show a promising relationship between the gust-front speed of motion and maximum shear.

Greene, GE Frank, HW Bedard, AJJ Korrell, JA Cairns, MM National Oceanic and Atmospheric Administration Final Rpt. FAA-RD-77-33, Feb. 1977, 131 pp

Contract DOT-FA76WAI-622

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043391/2ST

19 167006
INHALATION TOXICOLOGY: I. DESIGN OF A SMALL-ANIMAL TEST SYSTEM. II. DETERMINATION OF THE RELATIVE TOXIC HAZARDS OF 75 AIRCRAFT CABIN MATERIALS
In an effort to further the cause of increased safety for those who ride in commercial aircraft, this paper presents a detailed description of the genesis of a small-scale, laboratory test system that utilizes small animals to evaluate the relative toxic hazard of combustion products generated by the thermal decomposition of nonmetallic materials. It includes: a discussion of the concepts that led to the design; detailed instructions for fabricating the system; operating parameters and instructions for conducting a test; an evaluation of the system's performance as determined by the testing of 75 aircraft cabin materials; the utilization of animal response time as a basis for expressing relative toxicity; and a discussion of the derivation of an "inhalation dose" concept that promises to be more useful than "lethal concentrations." /Author/

Crane, CR Sanders, DC Endecott, BR Abbott, JK Smith, PW Federal Aviation Administration FAA/AM-77-9, Mar. 1977, 59 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043646/9ST

19 167184
EMERGENCY ESCAPE OF HANDICAPPED AIR TRAVELERS
This report describes a study conducted by the Civil Aeromedical Institute to investigate potential problems related to the emergency evacuation of civil aircraft carrying handicapped passengers. The study includes an analysis of the movement of individual handicapped subjects in an aircraft cabin and the results of evacuation tests in which a portion of the test subjects either were handicapped or simulated handicaps. Data are given relative to assistance to handicapped passengers, the effects of groups of handicapped passengers, seating location, floor slope, and exit type on the evacuation time. Suggestions by handicapped subjects and a summary of recent aircraft accidents involving evacuation of handicapped passengers are included as appendices to the report. (Author)

Blethrow, JG Garner, JD Lowrey, DL Busby, DE Chandler, RF Federal Aviation Administration FAA-AM-77-11, July 1977, 72 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A043269/0ST

19 167266
TRANSPORTATION SAFETY INFORMATION REPORT. APRIL, MAY, AND JUNE 1977 QUARTERLY HIGHLIGHTS
The quarterly report is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report is a discussion on Automobile Occupant Restraint Systems and an Intermodal Safety Affairs article on Occupant Restraint Systems in various other modes.
See also NTISUB/C/244-001. Paper copy also available on subscription, North American Continent price $30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-TES-77-2, Sept. 1977, 70 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTISUB/C/224-002

19 168095
JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY
This report is divided into two parts. Book 1 describes the traffic accident situation and contains statistics covering 1964-75. Separate chapters deal with (1) road traffic accidents, (2) railway accidents, (3) disasters at sea, and (4) aircraft accidents. Book 2 deals with traffic safety measures and contains three parts referring to: (1) measures related to land (road and railway) traffic safety, (2) measures relating to marine traffic safety, and (3) measures related to air traffic safety.

International Assoc of Traffic & Safety Sciences Monograph 1976, 235 pp, Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-228456)
ORDER FROM: International Assoc of Traffic & Safety Sciences, Prime Minister's Office, No 5, 5-Chome, Yaesu, Chuoku, Tokyo, Japan

19 168510
IMPROVED RESISTANCE TO ENGINE BIRD INGESTION
An analytical design method capable of quantitatively evaluating and ranking rotor blades for resistance to bird impact damage was investigated. This method was used to design blades having sufficient tolerance to meet the bird-ingestion requirements of FAR 33.77 for turbofan engines in the 6800 to 1600 lbf thrust class. The design procedure was also used for the preliminary design of a damage resistance boron/aluminum composite fan blade for the 6800 lbf thrust class engine. In addition, two protective devices designed to prevent an ingested bird from striking sensitive engine parts were presented. (Author)

Kaehler, HB
Avco Lycoming Division Final Rpt. FAA/RD-77-55, Mar. 1977, 233 pp

Contract DOT-FA76WA-3806

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A044203/8ST

19 168526
COLLISION RISK AND ECONOMIC BENEFIT ANALYSIS OF COMPOSITE SEPARATION FOR THE CENTRAL EAST PACIFIC TRACK SYSTEM
This report presents an evaluation of the application of composite separation to the Central East Pacific (CEP) track system. Criteria for the evaluation were a collision risk and an economic benefit's comparison of the existing four-route and proposed composite six-route systems. A 6-month data collection was performed. Radar data from land-based facilities in California and Hawaii and from Ocean Station Vessel November were processed to determine aircraft navigation performance. Utilization of the existing system was gauged from air traffic control facility data, and flight crew survey forms were used to collect information necessary for comparative analysis purposes. The report describes estimation of collision risk model parameters from the data. Lateral, longitudinal, and composite collision risk model risks

were estimated for the existing and proposed composite systems based upon accepted North Atlantic Systems Planning Group (NAT/SPG) methodology, while vertical collision risk was calculated based upon previous NAT/SPG studies. Lateral collision risk for the proposed composite system was found to be lower than for the existing structure. Comparisons of fuel burn and flight times indicated that the proposite composite system would be more economically beneficial than the existing route configuration. As a result of the study, the proposed composite system was recommended for implementation on a trial basis. (Author)

Busch, AC Colamosca, B Vander Veer, JR
National Aviation Facilities Experimental Center Final Rpt.
FAA-NA-77-32, FAA-EM-77-5, June 1977, 141 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A044317/6ST

19 168628
AIRPORT EMERGENCY MEDICAL SERVICES. A GUIDE TO PLANNING

Guidelines are presented to assist airport directors in initiating and implementing a plan for emergency medical services in airports. The following functions of the emergency plan are defined: the provision of triage and emergency services to casualties at a disaster site within a minimum of elapsed time; the provision of a holding area in the airport for further treatment and observation of injured persons not requiring immediate evacuation; and the orderly evacuation of injured persons to hospital facilities when appropriate. It is suggested that a physician be given the responsibility for coordinating and directing the airport's emergency plan. Considerations of personnel training, communications, and facilities and equipment to be taken into account in the overall plan are discussed. The following materials are appended to the guidelines: an outline of a 16-hour course in emergency medical care for airport personnel; a list of recommended medical supplies for the triage area and for emergency medical care bags; and a list of suggested readings.

Available from American Medical Association, 535 North Dearborn St., Chicago, IL 60610.

American Medical Association 1976, 21 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

HRP-0015596/0ST

19 168634
RADIOACTIVE MATERIALS AND NUCLEAR FUEL TRANSPORT REQUIREMENTS IN POLAND IN THE LIGHT OF INTERNATIONAL REGULATIONS

National regulations for the transport of radioactive materials and nuclear fuel in Poland are discussed. Basic transport requirements and regulations, transport experience including transport accidents and emergency service are described. The comparison with international regulations is given. (Atomindex citation 08:303929)

Available in microfiche only. International conference on nuclear power and its fuel cycles, Salzburg, Austria, 2 May 1977, 3.3.-T.1./03 1 table. U.S. Sales Only.

Musialowicz, T
International Atomic Energy Agency CONF-770505-301, 1977, 9 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

IAEA-CN-36/455

19 168635
UNITED STATES EXPERIENCE IN THE TRANSPORTATION OF RADIOACTIVE MATERIALS

The transport of radioactive material forms a vital link in the nuclear fuel cycle in the United States. Actual U.S. experience and practice with such systems for the packaging and transport of uranium ore concentrates, uranium hexafluoride, fresh fuel, irradiated fuel, non-high-level waste, and plutonium with low heat generation rates are described. Specific shipping systems in current use for these services are illustrated. A comparison will be made of shipping requirements for nuclear parks versus dispersed facilities. Shipping systems for other fuel cycle materials (e.g., high-level waste and cladding hulls) have not been developed because there has been no need to transport these materials commercially. However, conceptual designs for packaging and transport of such materials have been developed. Selected systems are reviewed and summarized. Transport safety in the U.S. is regulated by the U.S. Department of Transportation and the Nuclear Regulatory Commission. Key regulations defining packaging requirements, allowable radiation dose rates, and handling procedures are reviewed. Although the radioactive material shipping industry has an outstanding safety record, opposition to nuclear fuel cycle shipments has surfaced in several areas. The U.S. congressional ban on the shipment of plutonium by air, the actions of New York City to prohibit certain shipments within the city limits, and the requirement of U.S. railroads to ship spent fuel casks only in dedicated trains are reviewed. (Atomindex citation 08:303984)

Available in microfiche only. International conference on nuclear power and its fuel cycles, Salzburg, Austria, 2 May 1977, 3.3-T.1./08. U.S. Sales Only.

Platt, AM Rhoads, RE Hall, RJ Williams, LD Brobst, WA
International Atomic Energy Agency CONF-770505-346, 1977, 10 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

IAEA-CN-36/563

19 168638
INDUSTRIAL ASPECTS OF RADIOACTIVE WASTE MANAGEMENT IN WESTERN EUROPE

In 1980 there will be about 120 nuclear power reactors with 70,000 MWe in operation in Western Europe, and this number will be doubled by 1985, when the nuclear capacity in operation is expected to be 180,000 MWe. Predictions are made of the waste management requirements resulting from this nuclear expansion. Until a few years ago waste from nuclear research and from the use of isotopes in medicine has been the dominating source. Now there is a much larger proportion from the day to day operation of nuclear power reactors. Waste amounts from reprocessing of spent reactor fuel will rise more slowly. Waste production in other fuel cycle industries is relatively insignificant. There will be around 30 reactors and other nuclear plants to take out of operation in Western Europe around 1990. The large-scale handling of these wastes calls for overall management schemes, based on clear policies for storage and disposal. Questions are identified which have to be answered within the next few years in order to allow the orderly development of such large-scale waste management. These questions deal with: (i) rules and regulations, (ii) new technical evidence, (iii) administrative frameworks and responsibilities. Several areas of waste management are well suited to commercial waste operating firms, already established at present in a number of European countries. The scope for waste operators may include waste transportation, operating of own or government owned treatment and storage installations, and the carrying out of disposal operations. In the paper, development needs originally suggested by the Foratom waste study group will be discussed in the light of a late 1976 review to be carried through by European industry. (Atomindex citation 08:303906)

Available in microfiche only. International conference on nuclear power and its fuel cycles, Salzburg, Austria, 2 May 1977, 3.2.-T.1./01 6 tables. U.S. Sales Only.

Marcus, FR Seynaeve, F
International Atomic Energy Agency CONF-770505-288, 1977, 7 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

IAEA-CN-36/8

19 169124
EMERGENCY MEDICAL SERVICES: TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)

Air and ground transportation for rural and urban areas is covered by the selected citations. Some abstracts discuss the evaluation and planning of emergency medical service systems, using systems analysis and mathematical models. Specific subjects covered are helicopter ambulances, coronary care units, and Military Assistance to Safety and Traffic. Capital requirements and operating costs are also included. (Contains 50 abstracts)

Harrison, EA
National Technical Information Service Oct. 1977, 55 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-77/0906/6ST

19 169241
FAA LIGHTNING PROTECTION STUDY: HANDBOOK OF INSTALLATION PROCEDURES FOR SELECTED SOLID STATE EQUIPMENTS
The handbook summarizes lightning protection installation data as developed in a series of detailed reports previously prepared under the Post Doctoral Program by various authors. Each report is specifically referenced and in the appropriate handbook section. The handbook details the circuitry and parts lists for the equipments.

Cosel, RM
Rome Air Development Center, (9567) FAA-RD-77-170, Oct. 1977, 102 pp

Contract DOT-FA72WAI-356

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A047730/7ST

19 169279
MANPOWER ANALYSIS IN TRANSPORTATION SAFETY
This project provides a manpower review of national, state and local needs for safety skills, and projects future manning levels for transportation safety personnel in both the public and private sectors. Survey information revealed that there are currently approximately 121,000 persons employed directly in transportation safety occupations within the air carrier, highway and traffic safety, motor carrier, pipeline, rail carrier, and marine carrier transportation industry groups. The projected need for 1980 is over 145,000 of which over 80% will be in highway safety. An analysis of transportation tasks is included, and shows ten general categories about which the majority of safety activities are focused. A skills analysis shows a generally high level of educational background and several years of experience are required for most transportation safety jobs. An overall review of safety programs in the transportation industry is included, together with chapters on the individual transportation modes.

Bauer, CS Bowden, HM Colford, CA DeFilipps, PJ Dennis, JD
Florida Technological University, Department of Transportation Final Rpt. DOT/TST-77/40, May 1977, 359 pp

Contract DOT-OS-40020

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-275445/5ST

19 169359
THE 1975 ACCIDENT EXPERIENCE OF CIVILIAN PILOTS WITH STATIC PHYSICAL DEFECTS
The 1974 aircraft accident experience of civilian pilots with eight selected static physical defects has been examined and reported previously. Three categories--blindness or absence of either eye, deficient color vision with a waiver, and deficient distant vision--had significantly more accidents than were expected on the basis of observed-to-expected ratios. The 1975 accident data have now been examined. Again, the same three groups were found to have significantly more than their expected numbers of accidents. This year the reported recent and total flying times for all airmen with these defects were determined and accident rates were calculated. When the accident experience of airmen with any of these three static defects was compared with the active airman population accident experience per unit of recent and cumulative exposures, the rates for airmen with blindness or absence of an eye were still found to be significantly higher. Rates for airmen with color vision defects and a waiver were somewhat higher but of marginal significance. However, the rates for those with defective distant vision other than blindness or absence of an eye were similar and the difference was not significant. Only one of the FAA accident reports that were reviewed related the accident to the pilot's physical defect.

Dille, JR Booze, CF
Federal Aviation Administration FAA-AM-77-20, Aug. 1977, 9 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A045429/8ST

19 169445
INFLATABLE BODY AND HEAD RESTRAINT
This investigation established the feasibility of using an automatically inflatable restraint system as an alternative to the conventional restraint worn by helicopter crewmen. This type restraint provides increased crash protection because it provides automatic pretensioning which forces the occupant back in his seat, thereby reducing dynamic overshoot; reduces strap loading on the wearer when the inflated restraint is compressed during crash loading; reduces the concentration of strap loads on the body because of the increased bearing surface provided when the restraint is inflated; reduces head rotation and whiplash induced trauma. (Author)

Schulman, M McElhenney, J
Naval Air Development Center, (F41451) Phase Rpt. NADC-77176-40, Sept. 1977, 44 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A046477/6ST

19 169673
HEALTH HAZARD EVALUATION DETERMINATION REPORT NUMBER 75-195-396, UNITED AIRLINES MAINTENANCE BASE, SAN FRANCISCO INTERNATIONAL AIRPORT, BURLINGAME, CALIFORNIA
A Health Hazard Evaluation investigation was conducted by NIOSH at the working hangars of the United Airlines Maintenance Base, Burlingame, California, for worker exposure to substances used in the stripping, priming and painting of jet aircraft, and other solvents. Medical studies on a representative sample of workers and environmental measurements revealed that during paint stripping employees without respiratory protection are exposed to potentially toxic concentrations of methylene chloride, a fact also confirmed by the high rate of complaints of occasional eye and throat irritation, and head congestion when in close proximity to the paint stripping operation. Employees in contact with other solvents, including toluene, isopropyl alcohol, methyl ethyl ketone, n-butyl acetate, n-butyl alcohol, ethyl acetate, cyclohexanone, methyl isobutyl ketone, xylene, cellosolve acetate, and phenol, are not exposed to toxic levels of these agents. Employees who spray paint aircraft with paint containing hexamethylene diisocyanate may be exposed to potentially toxic levels of this agent, although this fact could not be conclusively established. Control measures are recommended.

Okawa, MT Keith, W
National Institute for Occupational Safety & Hlth 396 NIOSH-TR-HHE-75-195-, May 1977, 34 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-273779/9ST

19 170190
CORRELATION OF GENERAL AVIATION ACCIDENTS WITH THE BIORHYTHM THEORY
Biorhythms were calculated for over 4000 pilots involved in general aviation accidents in 1972. Data were obtained from the files of the National Transporation Safety Board. Exact data and time of accident were used, and 1200 hours (noon) was used as the average time of birth. Data were analyzed for correlation of aircraft-accident occurrence with both biorhythmically critical days and with individual and multiple low or negative phases of cycle. Data were calculated by both a 24-and 48-hour critical period and by all three cycles (physical, emotional, and intellectual) or only the physical and emotional cycles. Data did not deviate significantly from the random model, when analyzed by chi-square at the $p = 0.1$ level. No correlation was found between accident occurrence and biorhythmic criticality or low phase of cycle. This was true both for the cases in which the primary cause of the accident was attributed to pilot involvement and for those in which it was not.

Wolcott, JH (Armed Forces Institute of Pathology) McMeekin, RR Burgin, RE Yanowitch, RE *Human Factors* Vol. 19 No. 3, June 1977, pp 283-293, 26 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 172714
CABIN SAFETY BY CRASH SURVIVAL
This paper briefly traces development of crashworthiness requirements promulgated in pertinent airworthiness standards for general aviation aircraft. Primary emphasis is focused on protection of aircraft occupants in the survivable crash environment. The evolution of government involvement

in civil aviation and the FAA role in aviation safety are discussed, as well as the regulatory rulemaking process. A review of past and present crash protection requirements is presented. Pending regulatory action and future goals are mentioned.

Prepared for SAE Meeting, 29 March-1 April 1977.

Nelson, RW (Department of Transportation)
Society of Automotive Engineers Preprint SAE 770485, 1977, 16 pp, 31 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 172716
CRASH SIMULATION OF SKIN-FRAME STRUCTURES USING A FINITE ELEMENT CODE

A mathematical model for crash simulation of aircraft structures--built up from beams, stringers, and skin panels--is being developed in the form of a finite element, large displacement elastic-plastic computer code called DYCAST. As a preliminary exercise, the code was applied to simulate a low-speed forward impact of a skin-covered framework carrying large concentrations of nonstructural mass at its rear. The computer-generated data from the mathematical crash simulation can be extremely valuable in providing physical insight into the structural behavior in the crash event. With this insight, the structural details can be more intelligently changed by the addition, deletion, or alteration of individual or groups of members, and the consequences of these design changes on the predicted crash behavior can be quickly seen. The mathematical model internally computes the variable interactive nonlinear stiffness characteristics for each component, which greatly reduces the engineering effort required for such studies.

Prepared for SAE Meeting, 29 March-1 April 1977.

Winter, R (Grumman Aerospace Corporation) Pifko, AB Armen, HJ
Society of Automotive Engineers Preprint SAE 770484, 1977, 16 pp, 18 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 172717
FIRE ALARMS AND FIRE DETECTORS: CITATIONS FROM ENGINEERING INDEX DATA BASE

The design, testing, and applications of fire detection and fire alarm systems are investigated in these reports gathered from a worldwide literature survey. The majority of reports are concerned with civilian fire protection methods. However, aircraft, aerospace, and military applications for fire detection are included. This bibliography was prepared by searching the 1970-September 1976 data base of Engineering Index. It contains 150 abstracts.

Habercom, GE, Jr
National Technical Information Service Nov. 1977, 150 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL, NTIS

NTIS/PS-76-0874

19 172718
FIRE ALARMS AND FIRE DETECTORS: CITATIONS FROM THE NTIS DATA BASE

The design, testing, and applications of fire detection and fire alarm systems are investigated in these Government-sponsored research reports. The majority of reports are concerned with civilian fire protection methods. However, aircraft, aerospace, and military applications for fire detection are included. This updated bibliography was prepared by searching the 1964-September 1976 data base of NTIS. It contains 157 abstracts, 37 of which are new entries to the previous edition.

Habercom, GE, Jr
National Technical Information Service Nov. 1976, 154 pp

ACKNOWLEDGMENT: EI
ORDER FROM: ESL, NTIS

19 172746
CONTROLLED FLIGHT INTO TERRAIN ACCIDENTS: SYSTEM-INDUCED ERRORS

Controlled flight into terrain accidents are those in which an aircraft, under the control of the crew, is flown into terrain (or water) with no prior awareness on the part of the crew of the impending disaster. This paper examines recent experience with these accidents, seeing them as the result of errors generated by a complex air traffic control system with ample opportunities for system-induced errors. Such problem areas as pilot-controller communication, flightdeck workload, noise-abatement procedures, government regulation, visual illusions, and cockpit-and ground-radar warning devices are discussed, with numerous examples of recent accident cases. The failure of the human factors profession to play a more significant role in the air traffic complex is also considered.

Wiener, EL (Miami University, Coral Gables) *Human Factors* Vol. 19 No. 2, Apr. 1977, pp 171-181, 28 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 172764
AIRCRAFT OPERATIONAL EXPERIENCE AND ITS IMPACT ON SAFETY AND SURVIVABILITY

Proceedings includes 25 papers dealing with aircraft accident statistics and analysis, design practices for aircraft safety, design for aircraft vulnerability and survivability, operational experience, and aircrew safety considerations.

AGARD Conf Proceeding, Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976. For Individual papers selected by ATRIS see subject area 19, records 172765 through 172768 and 172770, record 01 172769 and record 01 172771, Bulletin 7801.

Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Jan. 1977, 340 pp

ACKNOWLEDGMENT: EI, NTIS
ORDER FROM: NTIS

AD-A037402/5ST

19 172765
RECOVERY AND ANALYSIS OF ACCIDENT DATA FROM FLIGHT RECORDERS IN CANADIAN TRANSPORT AIRCRAFT

A Playback Center has been established that is acquiring unique experience in recovering and analyzing information from a wide range of aircraft audio and data recorders. In particular, the Center has been designed to handle all cockpit voice recorders and flight data recorders fitted to Canadian civil and military transport aircraft. Recorders are forwarded to the Center whenever incidents or accidents warrant investigation by the authorities concerned. The playback facilities have been designed with special emphasis on the problems that might be encountered in these cases. Routine monitoring is also conducted on the military systems for maintenance purposes. Current and future capabilities of the Center are summarized and examples given of some of the work that has been undertaken.

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976.

Caiger, B (National Aeronautical Establishment, Canada)
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper, Jan. 1977, 23 pp, 3 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 172767
AVIATION SAFETY AND OPERATING PROBLEMS RESEARCH AND TECHNOLOGY

The paper presents some findings resulting from the NASA's Aviation Safety Research and Technology Program which is a broad-based multidisciplinary effort aimed at solving those operational problems where new knowledge or understanding is required. Topics includes prediction, detection, and measurement of clear air turbulence, lightning and thunderstorm gust hazards, some aircraft ground operating problems, aircraft fire technology, aircraft crashworthiness, and some results of aircraft wake vortex hazard research.

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976.

Enders, JH (National Aeronautics and Space Administration) Stickle, JW
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper 10, Jan. 1977, 30 pp, 17 Ref.

ACKNOWLEDGMENT: EI
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19 172768
STUDY (SAFETY ANALYSIS) OF AIRCRAFT SYSTEMS DURING TAKE-OFF AND LANDING
A general survey is first given of accident statistics and the results of evaluations of accident reports, which was carried out to define, in a quantitative way, the causes of accidents and critical flight phases. Procedures (e.g. for approach and departure) and activity for a selected aircraft type are then analyzed; the results of the analysis can be used as a basis for digital simulation. Finally, examples of specific equipment solutions, which are mainly designed to relieve the pilot, are given.

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976.

Keppeler, R
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper 12, Jan. 1977, 17 pp, 9 Ref.

ACKNOWLEDGMENT: EI
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19 172770
REDUCING FIRE HAZARDS IN COMMERCIAL TRANSPORT AIRCRAFT
A review is given of the status of fire prevention design practices for current commercial transport aircraft and of the research and development activities aimed at providing additional fire prevention design criteria. Some actual fire incidents are described as illustrative examples.

AGARD Conf Proceeding, Aircraft Operating Experience and Its Impact on Safety and Survivability at the Flight Mech Panel Symposium, Sandefjord, Norway, 31 May-3 June 1976.

Schaufele, RD (Douglas Aircraft Company, Incorporated)
Advisory Group for Aerospace Res & Dev-NATO Proceeding No. 212, Paper 17, Jan. 1977, 16 pp, 26 Ref.

ACKNOWLEDGMENT: EI
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19 172775
ANALYSIS OF AIRCRAFT ACCIDENTS INVOLVING FIRES
All U.S. Air Carrier accidents between 1963 and 1974 were studied to assess the extent of total personnel and aircraft damage which occurred in accidents and in accidents involving fire. The study established upper and lower bounds for deaths and damage due specifically to fire.

From the 1st Intl Conf on Fire Safety, University of San Franciso, 12-16 January 1976.

Lucha, GV (Stanford Research Institute) Robertson, MA Schooley, FA
San Francisco University Proceeding 1976, pp 103-115

ACKNOWLEDGMENT: EI
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19 172786
ACCIDENT RESEARCH AT THE UNITED STATES ARMY AGENCY FOR AVIATION SAFETY: AN OVERVIEW
Accident research techniques, methodology, and applications of results used are reviewed. This includes accident research in accidents, a pilot error model, concept of human error as a "behavioral anomaly" and multivariate statistical techniques used in accident research.

Congress of the Intl Ergonomics Assoc, 6th, and Tech Program of the Annual Meeting of the Human Factors Society, 20th, Proceedings, University of Maryland, College Park, July 11-16, 1976.

McDaniel, WC (Army Agency for Aviation Safety) *Human Factors* Proceeding 1976, pp 395-399, 2 Ref.

ACKNOWLEDGMENT: EI
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19 172805
REDUCING THE BIRD STRIKE HAZARD [Dampf dem Vogelschlag]
Various methods employed in different parts of the world to control the bird population around airports are described. The application of poisons, trappings, electronic devices, shotguns and noise makers is briefly outlined. [German]

Mattingly, A (Bird Control Incorporated) *Airport Forum* Vol. 6 No. 4, Aug. 1976, pp 13-28

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 173083
EVALUATION OF INFLATABLE ("AIR BAG") OCCUPANT RESTRAINT SYSTEMS FOR AIRCRAFT APPLICATION
The state-of-the-art of "air bag" technology was assessed for potential applications to aircraft. The design development is outlined, the subsystems assessed, and effectiveness discussed. Since most aircraft crash deceleration environments differ significantly from that of the automotive vehicle, it is uncertain how effective this system will work in aircraft without further extensive testing.

Proc of the 14th Annu Symp, SAFE (Survival and Flight Equip) Association, San Diego, California, September 13-16, 1976.

Snyder, RG (Michigan University, Ann Arbor)
Survival and Flight Equipment Association 1976, pp 147-150, 2 Ref.

ACKNOWLEDGMENT: EI
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19 173090
PROCEEDINGS OF THE ANNUAL SYMPOSIUM--SAFE (SURVIVAL AND FLIGHT EQUIPMENT) ASSOCIATION, 14TH, 1976
This volume contains some 37 papers covering topics of aircraft design for better safety of passengers and crew in aircraft. The efficiency of various accident prevention and emergency devices, such as masks, belts, air bags, seat ejectors and parachutes was investigated by many authors and results reported. Selected papers are indexed separately.

Proc of the 14th Annu Symp, SAFE (Survival and Flight Equip) Association, San Diego, California, September 13-16, 1976.

Survival and Flight Equipment Association Proceeding 1976, 180 pp

ACKNOWLEDGMENT: EI
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19 173093
SCALE TESTS OF A MULTI-SEAT AIRBAG
The natural frequency and damping of symmetrical and asymmetrical modes of a six seat airbag have been measured by using an approximately half-scale model. Pressure relief by venting of air is also examined, and the effect of changes in scale and geometry is discussed.

Stammers, CW (Bath University, England) *Journal of Sound and Vibration* Vol. 51 No. 1, Mar. 1977, pp 117-122, 7 Ref.

ACKNOWLEDGMENT: EI
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19 173473
SAFETY CRITERIA FOR FAIL-OPERATIONAL AUTOLAND SYSTEMS AND THEIR APPLICATION
The airworthiness requirements for the certification of automatic landing systems in civil aircraft include an explicit statement of the safety level to be achieved. For compliance with these requirements a safety assessment of the system must be made, and accepted by the airworthiness authority. It must contain a logical analysis which identifies all critical failure conditions of the system and shows that the probability of each is appropriate to the degree of hazard associated with it. It should also examine the factors which influence the performance of the system and show by means of analysis, simulation, and flight testing that the safety level will be acceptable. The analysis will establish the maintenance checks necessary together with their frequency, and any other limitations on the use of the system.

From Integrity in Electron Flight Control Systems.

Warren, DV (Civil Aviation Authority, England)
Advisory Group for Aerospace Res & Dev-NATO AGARDograph No. 224, Apr. 1977, pp 1-3, 1 Ref.

ACKNOWLEDGMENT: EI
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19 173485
NEED FOR IMPROVED AIRCRAFT CRASHWORTHINESS DESIGN
This report presents a review of Canadian aircraft accident statistics with particular emphasis on a special category involving damage to the fuselage

structure. In addition, the "crash environment" was investigated for various categories of aircraft to determine the predominant conditions and extent to which most aircraft were damaged.

Tennyson, RC (Toronto University, Canada) Bird, JW *Canadian Aeronautics and Space Journal* Vol. 23 No. 5, Sept. 1977, pp 269-278, 1 Ref.

ACKNOWLEDGMENT: EI
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19 173701
CLEAR AIR TURBULENCE ACCIDENTS
National Transportation Safety Board air carrier records for 1964-1975 show 68 accidents involving clear air turbulence (CAT). One hundred eighty-four persons were injured and there were thirty-six fatalities. Most aircraft involved were jets and most accidents occurred between 31,000 and 35,000 feet in normal cruise. CAT forecasting was not particularly accurate. The airlines have suffered severe economic penalties, probably in excess of $23,000,000 annually. It is concluded that more accurate and timely CAT forecasts are needed; CAT detection systems, airborne and ground-based are needed, and real-time weather data are required on the ground and particularly in the cockpit. /Author/

Brunstein, AI *SAFE Journal* Vol. 8 No. 1, 1978, pp 17-19, 1 Fig., 2 Tab.

ORDER FROM: SAFE Association, P.O. Box 631, Canoga Park, California, 91303

19 173845
AIRCRAFT ICING: STILL A SEVERE FLIGHT-SAFETY PROBLEM
Joint investigations have been carried out regarding the following problems: The atmospheric icing environment for modern transport aircraft; ice shapes and sizes on models in an icing wind tunnel; methods for making molds of ice; the effects of ice and hoar frost imitators on aerodynamic characteristics for a number of wing section and ice shapes, including advanced high lift devices; and flight tests for the determination of the effect of ice on flying characteristics. Icing effect prediction is discussed. Conclusions are presented which were reached from recent tests in a wind tunnel on a clean NACA 65A215 airfoil section as well as in a number of high-lift configurations with limited hoar frost and ice, and from flight tests. The findings indicate that: one must never ignore even slight icing; indications of the start of flow separation from the wind due to icing may be light buffeting of the aircraft, reduction of aileron control forces and roll disturbances; the development of flow separation from the wing due to icing is accelerated by a low landing approach speed and rough application of load factor larger than unity; the need for a timely activation of the anti-icing system.

Ingleman-Sundberg, M (Aeronautical Research Institute, Sweden) Turnov, OK (State Research Inst for Civil Aviation, USSR) *ICAO Bulletin* Vol. 32 No. 10, Oct. 1977, pp 11-13

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

19 173859
ADREP IS UP AND RUNNING
The objective of the ICAO Accident/Incident Reporting (ADREP) System is to provide states with services that they can employ in their own accident-prevention programs. Six main services are available: Prompt response to the requests of states; reasonable response to requests for federal information; monthly summaries of preliminary accident reports; an annual Digest of Accident statistics; periodical print-outs of states' reports and, ADREP computer programs. States contribute to ADREP by sending reports to ICAO on all accidents to aircraft of over 2,250 kg. States compile these reports using special computer-compatible reporting forms and the related ADREP Manual-Reports received from states are first checked against a "manual" log in which are recorded all accidents that have come to ICAO's attention on the basis of "unofficial information". These are entered into the mini-computer which then checks for previous reports on that accident. After being verified, edited and updated, the monthly batch of reports is then printed by the computer as a Preliminary Report summary. The information stored in the computer is checked four times: first manually, when the report is received, second, by mini-computer during input; third, by the edit-update program; and fourth, the submitting state.

Fritsch, O Thomsa, M *ICAO Bulletin* Vol. 32 No. 9, Sept. 1977, p 18

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, Public Info Off, P.O. Box 400, 1000 Sherbrooke St, West, Montreal, Quebec H3A 2R2, Canada

19 174330
RADIATION SAFETY IN HIGH-ALTITUDE AIR TRAFFIC
Results of an experimental and theoretical study on dose equivalent rates at high altitudes are presented. The flight personnel flying 500 hours per year at SST cruise altitude in high latitudes (maximum of radiation) would be exposed to less than 14N of the maximum permissible dose rate (MPD) for radiation workers (5 rem/yr), averaged over the solar cycle. One-half or more is due to energetic secondary neutrons that are penetrant and highly biologically effective. Passengers would, in general, be exposed only to the low-level galactic cosmic rays, except for a relative few who encounter rare, intense, and energetic solar-particle events. If the airplane descends to subsonic altitudes passenger exposure even then remains at or below permissible levels (0.5 rem for the general population).

Foelsche, T (Langley Research Center) *Journal of Aircraft* Vol. 14 No. 12, Dec. 1977, pp 1126-33

ACKNOWLEDGMENT: EI
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19 174333
SOME IMPORTANT RESULTS OBTAINED DURING THE ANALYSIS OF NEAR MIDAIR AND MIDAIR COLLISIONS [Einige wichtige erkenntnisse bei der analyse von kritischen annaeherungen und zusammenstoessen]
The report deals with theoretical studies concerning the analysis of near midair and midair collisions under visual meteorological conditions. The applicability of the rules of the air for pilots approaching a powered glider or flying in the critical area between converging courses and overtaking is studied. The effectiveness of horizontal evasive manoeuvres in this area is examined using some examples. Retrictions on a pilot's ability to see an approaching aircraft caused by meteorological phenomena, too small dimensions of the aircraft, the workload of the observing pilot, and by opaque structures in his cockpit are discussed. [German]

Weber, O *Deutsche Luft und Raumfahrt Forschungsbericht* No. 77-25, 1977, 37 pp, 10 Ref.

ACKNOWLEDGMENT: EI
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19 174566
AIRCRAFT ACCIDENT REPORT-JET AVIA, LTD. LEARJET, LR24B, N12MK, PALM SPRINGS, CALIFORNIA, JANUARY 6, 1977
At 1700 P.S.T., on January 6, 1977, a Gates Lear jet LR24B, N12MK, crashed in the mountains about 22 miles northwest of Palm Springs, California, at an elevation of about 9,700 feet m.s.l. The aircraft had departed Palm Springs Municipal Airport about 5 minutes earlier and was en route to Las Vegas, Nevada. The flight was operating in instrument meteorological conditions when the accident occurred. The aircraft was on an IFR clearance from Palm Springs, direct to Twenty-nine Palms, and thence via the flight plan route. After takeoff from runway 30 the pilot did not turn toward Twenty-nine Palms as cleared, but maintained runway heading until crashing into the mountainside. The National Transportation Safety Board determines that the probable cause of the accident was the flightcrew's misinterpretation of the instrument flight rules clearance, and subsequent ATC instructions issued by the Palm Springs Departure Control. Contributing to the accident was the controller's failure to detect the aircraft's deviation from the route of flight contained in the ATC clearance and the flightcrew's failure to recognize their proximity to the high terrain.

See also report dated 26 Sep 77, NTISUB/C/104-006. Paper copy also available on subscription, North American Continent price $35.00/year; all others write for quote.

National Transportation Safety Board NTSB-AAR-77-8, Oct. 1977, 35 pp

ACKNOWLEDGMENT: NTIS
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NTISUB/C/104-008

19 174569
ANALYSIS OF AIR ACCIDENTS INVOLVING AIRPLANES OR HELICOPTERS OF VARIOUS TYPES OF APPLICATION
The results are presented of a statistical analysis of air accidents involving two-and four-engine communications aircraft and general aviation aircraft up to 5.7 tons, with emphasis on agricultural aircraft, based on the whole on accident statistics published by the Civil Aeronautics Board. The occurrence rate of various kinds of accidents, involving fatalities or not, was calculated, the causes of the accidents are classified and some conclusions are drawn from the results regarding possible directions for future safer designs for general aviation aircraft.

Tran-Transl. Into English of Polish Conf. Paper. Misc-Original Language Document Was Announced as A76-28551. Conf-Presented at Ergonomics in Aviat: 1ST Natl. Sci. Technol. Conf., Warsaw, 17-19 May 1975 p 266-282.

Kostia, T
Scientific Translation Service NASA-TT-F-17443, Aug. 1977, 21 pp

Contract NASW-2791

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

N77-33128/8ST

19 174571
BIRD STRIKE HAZARDS: A BIBLIOGRAPHY, 1971-1976
A comprehensive collection of literature on aircraft bird strike hazards is presented. The entries are arranged into six groups: (1) literature survey; (2) bird ingestion; (3) environmental control; (4) laser techniques; (5) radar techniques; and (6) structural design. An author index is provided.

Murthy, HSS
National Aeronautical Laboratory NAL-BIBL-SER-77, June 1977, 22 pp

ACKNOWLEDGMENT: NTIS
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N77-33131/2ST

19 174593
LIGHT AIRPLANE CRASH TESTS AT IMPACT VELOCITIES OF 13 AND 27 M/SEC
Two similar general aviation airplanes were crash tested at the Langley impact dynamics research facility at velocities of 13 and 27 m/sec. Other flight parameters were held constant. The facility, instrumentation, tests specimens, and test method are briefly described. Structural damage and accelerometer data are discussed.

Alfaro-Bou, E Vaughan, VL
Langley Research Center NASA-TP-1042, Nov. 1977, 52 pp

ACKNOWLEDGMENT: NTIS
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N78-10034/4ST

19 174694
AN ANALYSIS OF THREE WEATHER-RELATED AIRCRAFT ACCIDENTS
Two aircraft accidents in 1975, one at John F. Kennedy International Airport at New York City on June 24 and the other at Stapleton International Airport at Denver on August 7, were examined in detail. The third accident on June 23, 1976 at Philadelphia International Airport is being investigated. All accidents occurred as aircraft, either descending or climbing, lost altitude while experiencing strong wind shear inside downburst cells.

Fujita, TT Caracena, F
Chicago University, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration Res Paper SMRP-RP-145, NOAA-77101302, Apr. 1977, 44 pp

Grant NGR-10-001-008

ACKNOWLEDGMENT: NTIS
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PB-275090/9ST

19 174695
[illegible] IMPROVED FIRE RESISTANT AIRCRAFT [illegible] MATERIALS, PHASE I
[illegible] and testing of a wide range of candidate materials is [illegible] commercially available materials were subjected to tests to evaluate their thermal characteristics, such as burn, smoke generation, heat release rate and toxicity. In addition, candidate materials were evaluated for mechanical, physical and aesthetic properties. Other properties considered included safety, comfort, durability and maintainability. The fiscal year 1977 and the projected 1980 cost data were obtained for aircraft seat materials.

Trabold, EL
Douglas Aircraft Company, Incorporated NASA-CR-152056, 1977, 124 pp

Contract NAS2-9337

ACKNOWLEDGMENT: NTIS
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N78-11042/6ST

19 175004
PROVISIONAL STANDARDS OF RADIATION SAFETY OF FLIGHT PERSONNEL AND PASSENGERS IN AIR TRANSPORT OF THE CIVIL AVIATION
Provisional standards for radiation affecting passenger aircraft are considered. Agencies responsible for seeing that the regulations are enforced are designated while radiation sources and types of radiation are defined. Standard levels of permissible radiation are given and conditions for radiation safety are discussed. Dosimetric equipment on board aircraft is delineated and regulation effective dates are given.

Tran-Transl. Into English from Vremennyye Normy Radiatsionnoy Bezopasnosti Letnogo Personala I Passazhirov Vozdushnogo Transporta Grazhdanskoy Aviatsil, USSR Ministry of Health (Moscow), Report Nbrbga-75, 1975 p 1-17. Subm-Transl. By Kanner (Leo) Associates, Redwood City, Calif.

National Aeronautics and Space Administration NASA-TM-75052, Oct. 1977, 20 pp

Contract NASW-2790

ACKNOWLEDGMENT: NTIS
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N78-11702/5ST

19 175016
MODEL PREDICTIONS OF WIND AND TURBULENCE PROFILES ASSOCIATED WITH AN ENSEMBLE OF AIRCRAFT ACCIDENTS
The feasibility of predicting conditions under which wind/turbulence environments hazardous to aviation operations exist is studied by examining a number of different accidents in detail. A model of turbulent flow in the atmospheric boundary layer is used to reconstruct wind and turbulence profiles which may have existed at low altitudes at the time of the accidents. The predictions are consistent with available flight recorder data, but neither the input boundary conditions nor the flight recorder observations are sufficiently precise for these studies to be interpreted as verification tests of the model predictions.

Williamson, GG Lewellen, WS Teske, ME
Aeronautical Research Associates of Princeton, Inc Final Rpt. NASA-CR-2884, July 1977, 161 pp

Contract NAS8-32037

ACKNOWLEDGMENT: NTIS
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N78-12627/3ST

19 175020
CHARACTERIZATION OF SECONDARY IGNITION SOURCES IN UNATTENDED COMPARTMENTS AND FULL-SCALE BASELINE TEST
The characteristics of five fuel loads burned within a metal lavatory were identified. In 15 of the tests the lavatory door remained closed for the 30-minute test period while in 15 additional tests the door was opened after the fire had developed. Upon completion of these tests the most severe source was selected for use in the baseline test. In the baseline test, the lavatory and adjacent panels, all of which were constructed of contemporary materials, were tested for a period of 1 hour. Thermal, environmental, and biological data were obtained for all fuel loads, door conditions, and the baseline test. All tests were conducted in a cabin fire simulator with separate ventilation of the cabin and lavatory representative of an inflight condition. The baseline

test established that by using the most severe fuel source: (1) the exposed animal subject survived without complications; (2) no toxic levels of gas within the cabin were detected; (3) a propagating fire did not develop in adjacent structures; (4) the lavatory containing the fire remained structurally intact; (5) decomposition of portions of the lavatory did occur; and (6) cabin visibility would have presented a problem after 5 minutes.

Klink, DM
Douglas Aircraft Company, Incorporated Final Rpt. NASA-CR-151573, Nov. 1977, 67 pp

Contract NAS9-14948

ACKNOWLEDGMENT: NTIS
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N78-13028/3ST

19 175089
THE TRANSPORTATION OF RADIOACTIVE MATERIAL BY AIR AND OTHER MODES. DOCKET NO. PR-71, 73 (40 FR 23768) VOLUME 2
This document includes all public comments received regarding the Draft Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes (NUREG-0034) and the NRC Staff responses to those comments. This document also identifies the major changes made from the Draft Statement to the Final Environmental Statement. Volume 2 includes comments on NUREG-0034 and major changes that have occurred since NUREG-0034 was issued. (Portions of this document are not fully legible).

See also Volume 1, PB-275529

Nuclear Regulatory Commission NUREG-0170-Vol 2, Dec. 1977, 553 pp

ACKNOWLEDGMENT: NTIS
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PB-275530/4ST

19 175289
APPLICATION OF FAILURE ANALYSIS IN AVIATION
The role of service failure analysis in defining new inspection procedures and adapting existing ones is illustrated by case histories. It appears that in some cases this leads to a different design or choice of material. The examples, all taken from failure analyses conducted by the National Aerospace Laboratory NLR, include: failures detected during inspections prescribed by the manufacturer, failures discovered after having learned about the experience of other operators of the same type of aircraft, failures discovered after an accident, and failures discovered more or less by chance. Examples are also presented of supplementary investigations aimed at extending and improving the available techniques for service failure analysis.

Conf-Presented at the Conf. On Non-Destructive Analysis, Twenthe, Neth., 13-14 Apr. 1977. In Dutch; English Summary.

Degraaf, EAB
National Aerospace Laboratory, Netherlands NLR-MP-77002-U, Jan. 1977, 55 pp

ACKNOWLEDGMENT: NTIS
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N78-14449/0ST

19 175380
INVESTIGATIONS TO SUPPORT PHASE I OF THE USAF MIDAIR PREVENTION SYSTEMS PROGRAM (MAPS)
The objectives of the study presented in this report were to: further define USAF requirements and objectives in reducing midair collisions; establish organizational relationships and participation in midair prevention efforts; investigate possible alternative methods to reduce USAF midair collisions; and further define follow-on phases of the Midair Prevention Systems (MAPS) program that the USAF could undertake to reduce midair collision potential. This report provides background information and analysis on the midair collision experiences of the USAF from 1968 through June 1977 and the near midair collision experiences from 1975 through June 1977. The midair and near midair collision information is analyzed from many different aspects such as altitude, type flight plan, category of aircraft, mission activity, commands, and phase of flight. Midair collision programs were identified and actions that could be taken by the USAF to reduce midair collision potential are specified. This report also identifies various organizations that would be involved with the USAF midair problem and identifies their relationships in attempting to reduce the midair potential. The report also discusses the FAA and civilian viewpoints and activities as they relate to midair collision prevention. (Author)

Crum, F Haspert, K Kowalski, S Sullivan, N Underwood, J
ARINC Research Corporation Final Rpt. 1924-01-1-1676, ASD-TR-77-76, Oct. 1977, 110 pp

Contract F09603-77-A-3104

ACKNOWLEDGMENT: NTIS
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AD-A049743/8ST

19 175387
AN EVALUATION OF THE BIRD/AIRCRAFT STRIKE HAZARD, MALMSTROM AFB, MT
The bird/aircraft strike hazard (BASH) at Malmstrom Air Force Base, Montana, was surveyed during the period 26 August-2 September 1977. Special emphasis was placed on local gull activities which contribute significantly to the bird strike potential. Recommendations aimed at reducing the airfield bird strike potential are part of this report. (Author)

Clark, LT Smedley, RD
Air Force Civil Engineering Center AFCEC-M-9-77, Sept. 1977, 19 pp

ACKNOWLEDGMENT: NTIS
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AD-A049637/2ST

19 175403
FACTORS OF SAFETY: HISTORICAL DEVELOPMENT, STATE OF THE ART AND FUTURE OUTLOOK
The concept of the factors of structural safety presently applied to the design of fixed-wing aircraft can be traced back some 50 years. The last decades have brought about rapid progress in establishing aerodynamic derivatives, defining load conditions and predicting structural loads as well as enabling more detailed analyses for stress and deformation to be made. The lack of a rational basis for the factors of safety together with the progress made brought about a discussion of changing the concept and the factors involved. The three pilot papers contained in this report address the different aspects which are envisaged, and show up inconsistencies of the present concept as well as means and methods for possible changes and examples of the outcome. An additional paper summarizes what is going on in the field of civil engineering with respect to structural safety.

Presented at the Meetings (43rd, 44th and 45th) and the Technical Address given at the Meeting (44th) of the Structures and Materials Panel of AGARD.

Advisory Group for Aerospace Res & Dev-NATO Proceeding AGARD-R-661, Nov. 1977, 69 pp

ACKNOWLEDGMENT: NTIS
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AD-A049380/9ST

19 175513
GUIDELINES FOR FLIGHT PLANNING DURING PERIODS OF HIGH OZONE OCCURRENCE
At jet cruising altitudes high ozone amounts sometimes occur in the cabin. The purpose of this report is to present, for airline operational personnel, the best current estimate of the average ambient (outside) ozone and its variability with time and space. These summaries are based on two types of observations: balloon ozonesonde data for stations in Japan, North America, and western Europe; and "GASP" data from commerical airliners obtained under the Global Atmospheric Sampling Program (GASP) conducted by the National Aeronautics and Space Administration. The relationship of ozone amount with stratospheric transport mechanisms is discussed, leading to the identification of several meteorological parameters which can be used to qualitatively forecast ozone on a daily basis. Also presented is a preliminary regression of ozone with stratospheric temperature, developed from GASP data. (Author)

Belmont, AD Wilcox, RW Nastrom, GD Hovland, DN Dartt, DG
Control Data Corporation Final Rpt. FAA-EQ-78-03, Jan. 1978, 159 pp

Contract DOT-FA77WA-4074

ACKNOWLEDGMENT: NTIS
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AD-A050988/5ST

19 175514
AIRCREW AND PASSENGER PROTECTIVE BREATHING EQUIPMENT STUDIES
This document represents a collection of various reports concerning the protective capability of passenger and crew oxygen breathing equipment and specialized devices and concepts against smoke and toxic gases produced by aircraft fires. (Author)

deSteiguer, D Pinski, MS Bannister, JR McFadden, EB
Federal Aviation Administration FAA-AM-78-4, Jan. 1978, 46 pp

ACKNOWLEDGMENT: NTIS
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AD-A051002/4ST

19 175528
EVALUATION OF SEATING AND RESTRAINT SYSTEMS AND ANTHROPOMORPHIC DUMMIES CONDUCTED DURING FISCAL YEAR 1976
The results of test programs conducted by the Protection and Survival Laboratory to investigate the performance of prototype or operational seating and restraint systems relative to their ability to provide protection against crash injury and to investigate the performance of anthropomorphic dummies in the dynamic environment are reported. The data in this report were previously presented in a memorandum report and are subject to additional evaluation or change upon review, conduct of additional testing, or receipt of additional facts. (Author)

Chandler, RF Trout, EM
Federal Aviation Administration FAA-AM-78-6, Feb. 1978, 44 pp

ACKNOWLEDGMENT: NTIS
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AD-A051691/4ST

19 175954
SIMULATION AND ANALYSIS OF WIND SHEAR HAZARD
The results of an unmanned simulation and an analysis of wind shear hazard are presented. The study involved the application of mathematical models of four diverse passenger aircraft types ranging from a small STOL commuter aircraft to a jumbo jet and of pilot models appropriate to each flight situation. The hazard to each aircraft was evaluated for both approach and takeoff in three severe wind shear profiles. The effects of varying operational techniques and propulsion system features were investigated and explained with the aid of a simplified linear analysis. No direct correspondence was found between wind shear hazard and aircraft size or type, per se. Instead, the main factors affecting sensitivity to wind shear were shown to be airspeed, flight path regulation, and airspeed regulation. Also, the shear dependency as modeled in the simulation was found to be important. (Author)

Lehman, JM Heffley, RK Clement, WF
Systems Technology, Incorporated Final Rpt. FAA/RD-78/7, STI-TR-1063-3, Dec. 1977, 157 pp

Contract NAS2-8889

ACKNOWLEDGMENT: NTIS
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AD-A052435/5ST

19 175986
RADIOBIOLOGICAL ASPECTS OF HIGH ALTITUDE FLIGHT: RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS IN SUPPRESSING IMMUNE CAPACITY TO AN INFECTIVE AGENT
The authors investigated the relative biological effectiveness (RBE) of fast neutrons compared with X-rays in impeding development of immunity to an infective agent, the intestinal cestode Hymenolepis nana. Mice were irradiated with neutrons or X-rays and 2 days later given an immunizing dose of H. nana eggs. After another 2 days, the mice received a challenge dose of the eggs. Challenge egg doses were also given to sham-irradiated unimmunized and immunized controls. All mice were killed 90 to 92 hours after challenge, and the H. nana larvae (cysticercoids) that developed in the intestinal tissue were counted. An increased cysticercoid count in the irradiated mice, as compared with the count in unirradiated immunized controls, reflects suppression of immune capacity by the radiation. The results indicate a neutron RBE of 4 at 50 and 101 rad. (Author)

Friedberg, W Neas, BR Faulkner, DN Hanneman, GD Darden, EBJ
Federal Aviation Administration FAA-AM-78-8, Feb. 1978, 8 pp

ACKNOWLEDGMENT: NTIS
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AD-A053204/4ST

19 175988
HUMAN RESPIRATORY CONSIDERATIONS FOR CIVIL TRANSPORT AIRCRAFT SYSTEM
This report is intended to acquaint personnel involved in the design, inspection, and maintenance of civil transport oxygen systems with the human respiratory requirements and oxygen system design considerations necessary to effect an interface and provide acceptable high-altitude life support. Simplified explanations and language that should be understandable by lay and semiprofessional engineering personnel are used, with references to sources of more detailed information. The oxygen system designer is directed to applicable Federal Aviation Regulations pertaining to oxygen systems and, where regulatory guidance does not exist, directs the reader to applicable oxygen equipment industry practices, standards, and information reports. (Author)

McFadden, EB
Federal Aviation Administration FAA-AM-78-9, Mar. 1978, 21 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A053223/4ST

19 175989
SPATIAL DISORIENTATION IN GENERAL AVIATION ACCIDENTS
Spatial disorientation (SD) refers to an incorrect self-appraisal of the attitude or motion of the pilot and his aircraft with respect to the earth. This paper defines elements of SD problems as encountered in general civil aviation. Accident reports made by the National Transportation Safety Board for a recent 6-year period were reviewed. Statistical computations were made relating SD to fatal accidents. Small fixed-wing aircraft (under 12,500 lb) accounted for 97.3 percent of all SD accidents. Inclement weather was associated with 42 percent of all fatal accidents, and SD was a cause or factor in 35.6 percent of these cases. Non-instrument-rated pilots were involved in 84.7 percent of SD weather-involved accidents. These and other data attest to the importance of this psychophysiological phenomenon (SD) in flight safety. Suggestions are made of ways to improve pilots' awareness and understanding of this problem.

Kirkham, WR Collins, WE Grape, PM Simpson, JM Wallace, TF
Federal Aviation Administration FAA-AM-78-13, Mar. 1978, 16 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A053230/9ST

19 175993
TRANSPORTATION SAFETY INFORMATION REPORT, OCTOBER, NOVEMBER, AND DECEMBER 1977 AND ANNUAL SUMMARY
The publication is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report are discussions on Railroad Tank Car Safety and Roadside Truck Inspections.

See also NTISUB/C/224-003 Paper copy also available on subscription, North American Continent price $30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-P24-77-4, Mar. 1978, 120 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTISUB/C/224-004

19 176087
ROTOR BURST PROTECTION PROGRAM: STATISTICS ON AIRCRAFT GAS TURBINE ENGINE ROTOR FAILURES THAT OCCURRED IN U.S. COMMERCIAL AVIATION DURING 1975
This report has been prepared as part of the Rotor Burst Protection Program (RBPP), which is sponsored by the National Aeronautics and Space Administration (NASA) and conducted by the Naval Air Propulsion Test Center (NAPTC). The objective of the RBPP is to develop criteria for the design of devices that will be used on aircraft to protect passengers and the aircraft structure from the lethal and devastating fragments that are generated by gas turbine engine rotor bursts. Presented in this report are statistics on gas turbine rotor failures that have occurred in U. S. commercial aviation during 1975. These statistics are based on data compiled from the Flight Standards Service Difficulty Reports (SDR) that were published by the Department of Transportation, Federal Aviation Administration (FAA).

DeLucia, RA Mangano, GJ
Naval Air Propulsion Test Center Final Rpt. NAPTC-PE-106, NASA-CR-135304, May 1977, 29 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052166/6ST

19 176089
AN EVALUATION OF THE BIRD/AIRCRAFT STRIKE HAZARD, MINOT AIR FORCE BASE, NORTH DAKOTA
The bird/aircraft strike hazard (BASH) at Minot Air Force Base, North Dakota, was surveyed during the period 2-13 September 1977. Special emphasis was placed on the bird strike hazards from gull populations on Minot AFB. Recommendations aimed at reducing airfield bird strike potential are included. (Author)

Clark, LT Thornton, RT Smedley, RD
Air Force Civil Engineering Center AFCEC-M-8-77, Sept. 1977, 29 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-A052213/6ST

19 176646
FIRE DETECTION AND EXTINGUISHING SYSTEM DESIGNED FOR CONCORDE
The Concorde is fitted with a Graviner Firewire Triple FD continuous element system for fire detection, and a discreet sensing element system for engine bay overheat detection. To comply with airworthiness requirements, these detection systems have been augmented by a Graviner optical system that uses the ultraviolet radiation emitted by a fire to detect engine combustion chamber flame burn-through. The Graviner Firewire Triple FD System relies on both resistive and capacitive electronic functions for its operation, thereby discriminating between true and false warnings caused by short circuits etc. Each of the four engines on the Concorde is protected by a Graviner type 208A dual-head automatic extinguisher supplying a spray nozzle system. The extinguishing systems of each adjacent pair of engines are interconnected using directional flow valves, thereby providing each engine bay with a "two shot" extinguishing capability.

Aircraft Engineering Vol. 49 No. 10, Oct. 1977, pp 8-11

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 176697
MATERIAL PERFORMANCE IN TRANSPORTATION VEHICLE INTERIORS
The goal of this work is to study not only the performance of materials in standard tests but to study the performance of materials in real world environments and the relationship of criteria such as the above guidelines document to real improvements in those environments from a fire safety standpoint.

Nelson, GL (General Electric Company) O'Connell, WJ Williams, JB Bridgman, AL *Journal of Fire and Flammability* Vol. 8 No. 3, July 1977, pp 262-278, 15 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 177009
SAFEGUARDING AND USE OF FIREARMS
No Abstract.

Federal Aviation Administration Feb. 1977, 3 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: Federal Aviation Administration, 800 Independence Avenue, SW, Washington, D.C., 20591

FAA 1600.53

19 177419
AIRCRAFT LIGHTNING VULNERABILITY TESTING
Flight critical fly-by-wire systems, solid state electronics, and an increased use of composite materials tend to increase the vulnerability of modern aircraft to lightning field effects. Lightning is transient, random and destructive. Therefore, laboratory testing is required to determine vulnerability levels. Laboratory testing provides design criteria data now, and improved circuit modeling can provide even better data. One such improvement is suggested and an example is given.

IEEE Proceeding of the National Aerospace Electronics Conference NAECON '77, Dayton, Ohio, May 17-19, 1977.

Boggess, RL, Director of Avionics Engineering (Wright-Patterson AFB) Institute of Electrical and Electronics Engineers Proceeding 77CH1203-9 NAECON, 1977, pp 282-285, 7 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 177431
FACTOR OF SAFETY/LIMIT LOAD CONCEPT-MAXIMUM LOAD CONCEPT
It is the philosophy of the present airworthiness regulations for airplane design to define the expected loads during operation in terms of limit loads. The required margin of safety between these limit loads and the ultimate loads has until now been covered by a factor of safety of 1. 5. The proposal is made to rethink the philosophy of having a fixed factor of safety, taking into account the probability of load occurrences and variations in the properties of materials. The load level of limited loads or of extremely rare occurrences could then be defined as maximum loads with a lower factor of safety. Three possible methods of predicting maximum loads are proposed.

AGARD Rep N661, Factors of Safety Historical Development, State of the Art and Future Outlook, paper presented at 43rd, 44th and 45th Meeting and Technical Address given at 44th Meeting of Structure and Materials Panel of AGARD 1977.

Struck, H
Advisory Group for Aerospace Res & Dev-NATO Proceeding 1977, pp 1-13, 18 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 178472
ANTIMISTING FUEL KINEMATICS RELATED TO AIRCRAFT CRASH LANDINGS
An approximate analysis is presented to quantitize kinematic behavior of antimisting Jt A fuel in an airstream representative of survivable aircraft crash landings. Antimisting fuel data were generated from a fuel expulsive airfoil placed in an airstream adjacent to a pulsing propane flame. Measurements of burning front velocities and accelerations were obtained from a camera located within the airfoil. These data were used in the analysis to predict the diameter, shear stress, and shearing strain rate of the average particle of antimisting fuel in the airstream under the airfoil. A description is given of the airflow-airfoil apparatus in the context of its simulation of crash landing conditions. The feasibility of using antimisting agents to suppress a fuel fire during a crash landing is evaluated.

San, MA (Naval Weapons Center) *Journal of Aircraft* Vol. 15 No. 3, Mar. 1978, pp 137-142, 12 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 178730
BIRD CONTROL AT BOSCOMBE DOWN
This article describes the control methods used to cut down on bird strikes at the Aeroplane and Armament Experimental Establishment at Boscombe

Down, the major Flight Test Centre in the United Kingdom, especially after the institution of a full-time Bird Control Unit there in 1976, which resulted in a considerable reduction in the problem. The methods used are intended to deter birds from the area rather than exterminate them. The most effective method of active deterrence was the use of specially trained falcons. In addition, SAPPHO Bird Distress Call broadcasting equipment was fitted to the fire-rescue and other vehicles and augmented by bird-scaring explosive cartridges fired by personnel driving the vehicles.

Vass, L *Journal of Air Traffic Control* Vol. 20 No. 2, Apr. 1978, pp 13-16, 1 Fig.

ACKNOWLEDGMENT: Journal of Air Traffic Control
ORDER FROM: Air Traffic Control Association, 525 School Street, SW, Suite 409, Washington, D.C., 20024

19 179302
WIND SHEAR UPDATE. PART 1
Large changes in wind velocity and/or direction occurring over relatively small distance produce an atmospheric condition known as wind shear. A change in wind direction produces a wind shear even when there is no change in velocity. Changing winds will alter ground speed, and inertia will resist those changes. The effect of groundspeed inertia causes an increasing headwind to increase an aircraft's airspeed, which in turn disrupts the equilibrium of forces acting on the aircraft and results in a requirement to readjust power and trim to maintain a desired flight path. For several reasons, wind shear has only recently been identified as a factor in accidents: Better identification techniques; higher approach speeds; and, better records of what occurred. In simulated studies, the rapid application of power and pitch-up maneuvering appeared to be fundamental elements in recovery from wind shear. The most important factor identified in successful maneuvering was the promptness with which corrective action was taken. The key to early recognition of wind shear is a through understanding of the phenomenon and the weather systems that generate it. The discovery of the spearhead and downburst phenomena is important because recognition of the spearhead can lead to early warning of developing downburst situations. Runways and approach paths can be changed and, when necessary, airports can be closed until the danger passes. Ground-based wind shear detection and forecasting and advisory service are two of the available means of finding wind shear. Airborne wind shear detection systems compare airspeed to ground speed or compare the wind component at the aircraft's position with the wind at the landing area.

Business and Commercial Aviation Magazine Vol. 43 No. 1, July 1978, pp 51-57

ACKNOWLEDGMENT: Business and Commercial Aviation Magazine
ORDER FROM: Ziff-Davis Publishing Company, 1 Park Avenue, New York, New York, 10016

19 179702
FLOTATION AND SURVIVAL EQUIPMENT STUDIES
This report is a collection of various studies, conducted over 15 years, of flotation and survival equipment used or proposed for aviation application, including developmental and prototype designs. Results of these studies were presented at scientific meetings and/or published in preprints or proceedings with limited distribution. Information obtained from several of the included studies is being used in the development of revised flotation equipment standards. (Author)

McFadden, EB
Federal Aviation Administration FAA-AM-78-1, Jan. 1978, 75 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
AD-A051869/6GA

19 180136
SURVIVAL AFTER A CRASH
This paper summarizes main points brought out in a number of papers dealing with techniques, equipment, and materials for minimizing the consequences of fires following crash landings. Some test results using protein foam and aqueous film forming foam are given, and some basic data on various new types of fire tenders are presented. Accident experience is analyzed to give ideas for rescue operations during fires. [German]

Scheichl, L *Airport Forum* Vol. 7 Oct. 1977, 3 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-16280)
ORDER FROM: AIAA
A78-16280

19 180146
HOW TO MAKE AN AIRPORT UNATTRACTIVE TO BIRDS
The paper presents methods for modifying the environment around airports to discourage the habitation of birds. The experience of the German Air Force is used as a model. Among the methods considered are sitting dumps far from runways, allowing grass to grow long and remain damp (because this environment is less suitable for the growth of large bird colonies), and allowing the growth of woods and thickets in the airport vicinity (because this habitat is suitable for smaller birds, which present less of a hazard to air traffic). [German]

Hild, J (Federal German Defence Geophysics Bureau, W Ger) *Airport Forum* Vol. 8 Feb. 1978, 7 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-29209)
ORDER FROM: AIAA
A78-29209

19 180161
LESSONS FROM INDIVIDUAL AIRCRAFT FIRE ACCIDENTS. TWA L1011 AIRCRAFT FIRE, LOGAN INTERNATIONAL AIRPORT, BOSTON, MASSACHUSETTS, 20 APRIL 1974
No Abstract.
International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Tryon, GH
National Fire Protection Association Proceeding 1976, 7 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40926)
ORDER FROM: AIAA
A77-40926

19 180162
THE AIRPORT AND FIRE FROM THE AIRPORT FIRE CHIEF'S VIEW
No Abstract.
International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Van der Meulen, SU
National Fire Protection Association Proceeding 1976, 9 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40925)
ORDER FROM: AIAA
A77-40925

19 180163
CRASH MANAGEMENT AT AIRPORTS
Meshing of community-supported rescue agencies (mutual aid for civil defense organizations) and airport-based crash rescue teams is discussed. Generally an airport should concentrate on providing immediately needed services, such as prompt firefighting. In accidents involving serious fire, for example, only sixty to ninety seconds may be available for evacuating the cabin. Evacuation teams should arrive with the second wave of firefighting equipment and should be equipped to gain access to the cabin in the presence of fire damage and in any crash configuration; be able to work in a toxic atmosphere; and be trained in using backboard and other victim handling techniques. Back-up manpower should be capable of controlling crowds, manning first aid stations, and coordinating airport and community rescue services. Operating a victim profile and a spectrum of hypothetical accidents is discussed, and a typical response system for an airport with two ambulances, a paramedic team, and one doctor is outlined. The time periods needed to evacuate, triage, transport, and begin treatment of victims are also defined.
International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Self, JC (International Management Services International)
National Fire Protection Association Proceeding 1976, 11 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40928)
ORDER FROM: AIAA

A77-40928

19 180164
THE AIRPORT AND FIRE FROM THE AIR CARRIER'S VIEW
The ability of airport firefighting crews to provide adequate protection and assistance to air carriers in the case of accidents involving fires or entailing risk of fire is assessed. The performance of firefighting crews in four recent jet aircraft accidents is evaluated. Problems arising from failure to designate authority and responsibility in firefighting efforts and difficulties in coordinating firefighting and rescue operations are discussed. The need for strict standards regarding the training of firefighting and rescue personnel and equipment is stressed, together with the importance of developing plans for integrating available personnel and equipment in individual airports.

International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Powers, PR (American Airlines, Incorporated)
National Fire Protection Association Proceeding 1976, 9 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-4093)
ORDER FROM: AIAA

A77-40931

19 180165
VEHICLES AND EXTINGUISHANTS--FOAMS FOR AIRCRAFT FIRES
Three fire-extinguishing foams used to combat aircraft fires are compared with respect to the quantities of precursor water and powder required for different categoreis of airports. The three foams are a protein foam, an aqueous film-forming foam, and a fluoroprotein foam (FP 70). The properties of the fluoroprotein powder are examined. Characteristics of the fire-fighting vehicles which transport the foam precursors are discussed, and powder and water delivery rates are examined. Other topics, such as fire-fighting in a fog and the development of foam-delivering boats for use at airports adjacent to a body of water, are considered. [French]

International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Pizel, R (Orly Airport, Security Service, Paris)
National Fire Protection Association Proceeding 1976, 9 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40932)
ORDER FROM: AIAA

A77-40932

19 180166
AIRCRAFT FIRE FIGHTING TACTICS--HANDLING OF EQUIPMENT
Rescue equipment and techniques in use at Dutch airports are discussed. An inexpensive firefighting unit designed for single-man operation at the smallest airports is described, as well as a larger version of the vehicle, employing a combination of premix and dry chemical extinguishing agents. A medium-sized airport requires one of the larger vehicles and two foam tenders, while a large airport (such as the Schiphol airfield) requires at least two sets of this equipment, operating from separate stations. Use of monitors and hoselines in combatting open fuel fires is assessed, together with the special problems of engine and wheel fires. Techniques for forcing entry into disabled craft and evacuating vicitims are considered, and a portable breathing apparatus permitting nine minutes of rescue work time inside a smoke-filled craft is described.

International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Koppert, AJ
National Fire Protection Association Proceeding 1976, 6 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40938)
ORDER FROM: AIAA

A77-40938

19 180167
THE AIRPORT FIRE DEFENSE--THE BASIC MISSION AND NEEDS
The basic mission of airport fire defense involves the ability to respond to a fire within three minutes and preferably in less than two minutes, the maintenance of survivable conditions within the aircraft until fire control has been achieved, the creation of safe conditions for evacuation or rescue, and the effective transportation of casualties. To fulfill this mission specialized equipment and training are needed. Aspects of the basic mission and needs are discussed, and traits of airport accidents are considered.

International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Ferguson, RJ (British Airports Authority)
National Fire Protection Association Proceeding 1976, 10 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40944)
ORDER FROM: AIAA

A77-40944

19 180168
BALANCING THE COSTS OF RESCUE SERVICES AND FIRE FIGHTING AMONG DIFFERENT CATEGORIES OF AIRPORTS
The difficulties that minor airports face in financing rescue services and fire fighting procedures suitable for the largest airplanes are examined, and the costs are analyzed with respect to traffic. A method of balancing costs is proposed which is based on the total traffic of the airport as the total traffic is a determinant of its actual resources. Cost-efficiency optimization is considered. [French]

International Seminar on Aircraft Rescue and Fire Fighting, Geneva, Switzerland, 13-17 September 1976.

Ansart, F (Direction Generale de l'Aviation Civile, France)
National Fire Protection Association Proceeding 1976, 16 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-40950)
ORDER FROM: AIAA

A77-40950

19 180422
ECONOMICS OF COMMERCIAL AVIATION SAFETY
It is shown that fundamental societal value judgments must be solved in order to determine the degree of commercial aviation safety that is socially optimal. It is also suggested that considerable care is required to arrive at an optimal social policy due to the complexity presented by the interaction of the regulated manufacturers. Highly simplified models may be useful in delineating some of the issues in these more complex and realistic problems of safety, economics and regulation.

Proceedings of the Annual Reliability and Maintainability Symposium, Los Angeles, January 17-19, 1978. Also available from IEEE (78CH1308-6R).

Wynholds, HW (ECON, Incorporated) Bass, L
Institute of Electrical and Electronics Engineers Proceeding IEEE 1519, 1978, pp 162-166

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 180424
ANALYSIS OF THE ECONOMIC BENEFITS OF UTILITY HELICOPTER SAFETY DESIGN FEATURES
An analysis of the economic benefits of providing crashworthiness and other flight safety improvements within future Army utility helicopters is discussed. The analysis is based on a study of Army/Bell Helicopter UH-1H aircraft accident reports and projects future accident losses for a number of candidate utility helicopter designs. Losses are projected for a twenty year period of peacetime operation. Projections are derived based on each candidate's design features and the effectiveness of these features in accident/injury prevention under the particular circumstances in each UH-1H accident.

Proceedings of the Annual Reliability and Maintainability Symposium, Los Angeles, January 17-19, 1978. Also available from IEEE (78CH1308-6R).

Hicks, JE (Army Agency for Aviation Safety, Fort Rucker)

Institute of Electrical and Electronics Engineers Proceeding IEEE 1518, 1978, pp 157-161

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

19 180435
IMPROVING THE SAFETY OF AIR TRANSPORT [Il *migioramento* della sicurezza nel trasporto aereo]
In spite of the great technological advances in aircraft and air traffic control, any aircraft accident revives fears regarding the safety of air travel. This article reviews some accident statistics from the International Organization for Civil Aviation which show a record value of 0.08 passengers killed per 100 million passengers/km in 1975, compared to just over 1.2 in 1951. These figures for regular airlines (and excluding USSR and China) indicate that to reach the average probability of incurring an accident at the 1975 value, a passenger must travel more than 1 billion air km per year, compared to the recognised analogous figure of 500000 km for rail travel. The author indicates human engineering, airport rescue and fire services, as sectors in the industry which require improvement. [Italian]

Darrione *Strade* Mar. 1977, pp 121-125, 3 Fig., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-232849)

20 166613
METHOD AND APPARATUS FOR INTERROGATING AND IDENTIFYING FIXED OR MOVING TARGETS
Hijacked vehicles, or the like, are identified by illuminating a transponder mounted to the vehicle by a beam of microwave energy, e.g., from a helicopter flying over the traffic. The transponder includes non-linear diodes which reradiate a signal back towards the helicopter. Means are disclosed for modulating the return signal with a 16-bit identification code, each bit of which is transmitted as a 31-bit pseudo-random code.

Supersedes PAT-APPL-579 658-75. Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, D. C. 20231 $0.50.

Siverhus, AV Matava, JA Klose, DR
Department of the Army Patent PAT-APPL-579-658, PATENT-4 015 259, No Date, 8 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

AD-D003959/4ST

20 173082
DETECTION OF HIDDEN EXPLOSIVES ON PASSENGER AIRCRAFT USING HAND SEARCHERS, BIO-SENSORS AND VAPOUR DETECTORS
A series of tests was carried out to assess the effectiveness of current vapor sensing technology as an aid in detecting concealed explosives on board passenger aircraft. An examination is made of the results obtained from these and other related experiments, and possible areas of R&D to improve the usefulness of electronic search aids are suggested. Also discussed are means of improving the effectiveness of trained dogs for searching. Recommendations are also offered aimed at optimizing aircraft search procedures.

Int Conf on Crime Countermeas, Sci and Eng, Proc, Univ of Ky, Lexington, July 25-29, 1977.

Seman, G Elias, L *Kentucky University, Res & Eng Services Bulletin* No. 113, 1977, pp 65-84, 7 Ref.

ACKNOWLEDGMENT: EI
ORDER FROM: ESL

20 174342
CONVENTIONS ALONE WILL NOT ENSURE CIVIL-AVIATION SECURITY
The author discusses the problem of civil aviation and notes that major security conventions can only offer advice, education, and point the way. Civil Aviation security also requires sophisticated electronics and the implementation of proven security procedures by experienced personnel, supported by a determined policy of aviation authorities. It is noted that every security incident begins on the ground and usually because somebody on the ground has failed in his task. The security operative at the concourse or gate check-point needs to be the most professionally trained as well as constantly encouraged and supervised. X-rays, metal detectors, sniffers, and sealers are discussed with respect to mail bags, baggage, and cargo. In addition to professional training, examples of leadership from the top and personal encouragement are more likely to bring forth the desired voluntary effort and dedication, than instruction manuals or regulations.

Dorey, FC (International Aeradio Consult Serv Limited, UK) *ICAO Bulletin* Vol. 33 No. 1, Jan. 1978, pp 18-20, 1 Phot.

ACKNOWLEDGMENT: ICAO Bulletin
ORDER FROM: International Civil Aviation Organization, 1080 University Street, Montreal 101, Quebec, Canada

20 174621
DOCUMENTED PERSONNEL EXPOSURES FROM AIRPORT BAGGAGE INSPECTION SYSTEMS
Whole-body and wrist exposure to X-radiation from airport baggage inspection systems is documented. Specially designed badges were worn by 72 security personnel for 2-week intervals at 5 major United States airports. At least one model of each baggage X-ray system in use during the study was investigated. The data represent the total exposure received by security personnel under normal working conditions. Measurements of the X-ray exposures over the 2-week period ranged from 0 to 16.4 milliroentgen with little difference noted between whole-body and wrist exposures. The results indicate that no measured dose equivalent exceeded the limits specified in the Occupational Safety and Health Administration standard for ionizing radiation.

Sensintaffar, EL Moss, CE Parr, WH
National Institute for Occupational Safety & Hlth DHEW/PUB/NIOSH77/105, Oct. 1976, 16 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-274202/1ST

20 175119
COST EFFECTIVENESS OF ALTERNATIVE METHODS OF PROVIDING AIRPORT SECURITY AT HAWAII STATE AIRPORTS
Security service at Hawaii's State airports is presently provided jointly by a number or organizations. The Federal Government provides customs, immigration, and agricultural inspections. Airlines provide primary preboard screening, as required by federal (FAA) regulation. The remaining security functions--patroling, guarding, traffic control--come under State jurisdiction and are discharged under State contract by a private security service (Burns International) either with county police assistance (Honolulu International, Hilo, and Keahole Airports) or with the assistance of state security personnel (Maui and Kauai). In this study, we analyzed the cost-effectiveness of alternative methods of providing that airport security which comes under State jurisdiction was analyzed. Costs per man-hour among the modes presently in use at Hawaii's state airports were compared. These comparisons, for 1975, indicate that the principal differences lie in personnel costs. These stem from policy differences in the mix of personnel used as well as in personnel compensation. Focusing the analyses on Honolulu International Airport (HIA), it was noted that the present arrangement--using both private contract security personnel and police officers from the Honolulu Police Department--is not the most costly arrangement possible. Personnel costs would have been 49% higher had all the security services been provided by police officers, assuming the respective personnel policies remained unchanged.

Prepared in cooperation with Hawaii Dept. of Budget and Finance, Honolulu. Sponsored in part by Department of Health, Education, and Welfare, Washington, D.C.

Mak, J Fallin, L Pattur, J Szocik, C Tanaka, R
Georgia Department of Transportation, Hawaii Department of Budget and Finance, Department of Health, Education and Welfare June 1976, 64 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

PB-275852/2ST

20 180139
LASER PHOTOACOUSTIC DETECTION OF EXPLOSIVE VAPORS
Development of a device using photoacoustic spectroscopy for the detection of vapors from explosives is discussed; the detector under consideration involves spectral identification of vapors with a CO2 laser. Studies of the identification of vapors such as ethylene glycol dinitrate, nitroglycerine, 2,4-DNT, diphenylamine, methylamine and cyclohexanone, as well as interference species such as acetone, heptane freon and ammonia are reported; detection limits in the 0.05 part per billion range are contemplated. The design program aims at producing a portable detector needing little maintenance and costing less than current x-ray devices.

Optics in Security and Law Enforcement; Proceedings of the Seminar, Reston, Virginia, April 18-21, 1977. Sponsored by the Society of Photo-Optical Instrumentation Engineers, Bellingham, Washington.

Gelbwachs, J (Aerospace Corporation)
Society of Photo-Optical Instrumentation Engineers Proceeding Vol. 108 1977, pp 10-15

ACKNOWLEDGMENT: National Aeronautics and Space Administration (78A-18718)
ORDER FROM: AIAA

78A-18718

20 180152
AIRPORT FIRES AND THEIR CAUSES
A general consideration of the susceptibility of buildings and sites to spreading fires is presented, and the fire hazards encountered in and around

airports are studied. Fires in fuel pipelines, rail tank cars, airfield fuel trucks and fuel transport vehicles, fuel tank farms, hangars and workshops are discussed; attention is also given to fire hazards in parked aircraft, as well as in aircraft during engine start-up and taxiing and during maintenance operations. Engine fires, fires due to the interaction of welding arcs and fuels, and fires caused by electrostatic charging near exposed fuels are mentioned. [German]

Scheichl, L *Airport Forum* Vol. 8 Apr. 1978, 6 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A78-35274)
ORDER FROM: AIAA

A78-35274

20 180160
THE POSITION OF THE AIRPORT OPERATOR WITHIN THE SCOPE OF ADMINISTRATIVE MEASURES IN DEFENSE AGAINST EXTERNAL DANGERS IN AIR TRAFFIC

The concept "external dangers" comprises all premeditated actions which interfere with the safety of the air traffic, unless these actions are directly related to technical operational procedures. Such actions include the hijacking of aircraft, the taking of hostages, and bomb threats against aircraft and installations serving the air traffic. Legal regulations dealing with such actions in West Germany are discussed, taking into account the obligations of the airport operator on the basis of these regulations. Attention is given to the obligation of the airport operator to provide and maintain rooms required for supervision measures, obligations related to a general responsibility of the airport operator for operational safety, and the right of the aviation authorities to interfere directly with the operation of the airport by an enactment of suitable administrative acts. [German]

Borst, HJ *Zeitschrift fuer Luft und Weltraumrecht* Vol. 26 June 1977, pp 126-132

ACKNOWLEDGMENT: National Aeronautics and Space Administration (A77-39661)
ORDER FROM: AIAA

A77-39661

21 142480
MODAL CHOICE AND THE VALUE OF TRAVEL TIME
This book brings together a number of recent research studies dealing with both modal choice and value of savings in travel time. The titles of the individual studies are as follows:-A diagnostic survey of urban journey-to-work behaviour-Heggie,IG; Modal choice behaviour and the value of travel time: Recent empirical evidence-Earp,JH, Hall,RD and McDonald,M: The skyport special: An experimental personalized bus service-Heraty,MJ; Valuation of commuter travel time savings: An alternative procedure-Hensher,DA; The value of travel time savings and transport investment appraisal-Jennings,A and Sharp,C; Resource value of business air travel time-Carruthers, RC and Hensher,DA. /TRRL/

Oxford University Press 1976, 190 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD 221939)

21 147858
ON ESTIMATING EFFECTIVE FREQUENCIES AND AVERAGE WAITING TIMES FOR INDIRECT CONNECTIONS
This paper is concerned with the problem of estimating two important service properties of transportation systems in which a traveler may have to use more than one vehicle to complete his journey, such as in urban public transport or intercity air, bus or rail systems. The service properties are waiting time for connections and effective frequency of service from origin to destination. These two service characteristics are among those five-cost, travel time in the vehicle, waiting, access time, and departure frequency-typically found to be most important in transportation planning models for estimating system usage. Despite their importance, there exist no methods for estimating waiting time and frequency which are compatible with the information available in transportation planning studies. In this paper theoretical models for estimating these are developed and then tested with actual data. They are found to be quite accurate in terms of quality of fit to the empirical data. Their use in urban and intercity transportation planning contexts is described, along with the data required, which consists simply of the number of vehicle trips on each of the links and for each of the time periods of interest. /Author/TRRL/

Sen, AK (Illinois University, Urbana) Morlok, EK (Pennsylvania University, Philadelphia) *Transportation Planning and Technology* Vol. 3 N 1976, pp 175-83, 1 Tab., 9 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-223276)
ORDER FROM: ESL

21 152450
TIME SPENT ON JOURNEYS IN THE GERMAN FEDERAL REPUBLIC [Der Zeitbedarf fuer Reisen in der Bundesrepublik Deutschland]
One of the most important factors influencing the choice of transport mode, is the time taken for the journey. To determine this time as exactly as possible, a record was kept of the different time elements in journeys by private car, by rail and by air, using speed measuring distances covered by car, by measuring time constants, by surveys among passengers, and by the study of existing documents and a geometrical analysis. [German]

Breimeier, R *Internationales Verkehrswesen* Vol. 28 No. 4, July 1976, pp 204-213, 8 Fig., 1 Tab., 37 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

21 163593
DEMAND FOR AIR TRAVEL BETWEEN NEW YORK CITY AND OTHER LARGE CITIES
The object of the research is to develop and use an air travel demand model between New York City and other large cities. Demand is organized into a 3-way classification (time period, city destination, and airline) that corresponds to the 3-stage decision made by the traveler. Analysis of variance is used to test the significance of the classification. Each section of the demand model is then estimated by variables determining that part of the travel decision. This model is significant because it breaks down demand to allow an economic analysis of each section, and because more accurate extrapolation forecasting of air travel demand within each classification is possible when each section of the model is estimated. /Author/

Su, V Huffman, L (New York City University) *Transportation Research Record* No. 529, 1975, pp 10-16, 2 Tab., 4 Ref.

ORDER FROM: TRB Publications Off

21 166640
TOURISM AND VACATION TRAVEL: STATE AND LOCAL GOVERNMENT PLANNING (A BIBLIOGRAPHY WITH ABSTRACTS)
Economic and socioeconomic aspects of vacation travel and tourism in various localities of the United States are documented. Most of these studies deal with the use of tourism for the economic development of local communities. Special attention is given to wilderness, coastal zone, lake, waterway, and Indian Reservation areas. Planning for scenic and historic areas is cited. (This updated bibliography contains 105 abstracts, 26 of which are new entries to the previous edition.)
Supersedes NTIS/PS-77/0575, NTIS/PS-77/0292, NTIS/PS-76/0306, and NTIS/PS-75/148.

Adams, GH
National Technical Information Service Aug. 1977, 110 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
NTIS/PS-77/0684/9ST

21 169201
TRAVELER INFORMATION NEEDS
The study was to determine from data collected over a four-month period the range and volume of traveler information requests at Dulles International Airport, Union Station, and the National Visitor Center (NVC) in the Washington, D.C. area. This study identifies: sources of available traveler-related information, hindrances to travelers which are transportation related, and information needs of travelers, especially the inexperienced traveler and the international visitor. The final objective is to provide guidance and recommendations as to the form and nature of a future, more centralized traveler information system.

International Visitors Information Service, Department of Transportation
DOT/RSPD/DPB/40-77/1, Sept. 1977, 87 pp

Contract DOT-OS-60522

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS
PB-274360/7ST

21 172521
STATISTICAL YEARBOOK. TRANSPORT, COMMUNICATIONS, TOURISM 1975 [Annuaire Statistique. Transport, communications, torisme]
Statistical data are given on railways, roads, inland waterways, merchant shipping, aviation, pipelines, post and telecommunications and tourism for West Germany, France, Italy, the Netherlands, Belgium, Luxembourg, United Kingdom, Ireland and Denmark. /TRRL/ [French]

European Communities Statistical Office Monograph June 1977, 135 pp, Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-230078)
ORDER FROM: European Communities Statistical Office, Boite Postale 1003, Luxembourg, Netherlands

21 173828
CONSUMERS' GUIDE TO AIR CHARTERS
No Abstract.

Civil Aeronautics Board Aug. 1977, 22 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO
C31.206/9:Ai7

21 174951
TRAVEL HABITS AND PATTERNS, VOLUME 2. 1974-JAN 78 (A BIBLIOGRAPHY WITH ABSTRACTS)
This two-volume work is devoted to U.S. travel patterns and habits primarily in urban areas. Presented are discussions on mass transit, modal choices and split, parking, park and ride, and commuting. Disadvantaged, disabled, student, and various age groups are studied along with recreational data. References are made to dial-a-ride, dual mode, car pooling, taxicab, railroad, rapid transit railways, and aircraft. (This updated bibliography

contains 179 abstracts, 25 of which are new entries to the previous edition.)
Supersedes NTIS/PS-77/0033, and NTIS/PS-76/0026. See also Volume 1, 1964-73, NTIS/PS-76/0025.

Kenton, E
National Technical Information Service Jan. 1978, 184 pp

ACKNOWLEDGMENT: NTIS
ORDER FROM: NTIS

NTIS/PS-78/0020/4ST

21 176624
TRAVEL IN THE MANAGEMENT AND OPERATION OF FEDERAL PROGRAMS
This report discusses the nature and extent of Federal travel, the reasons for the travel; and the executive branch travel policies, procedures and practices. The Federal Government spends about $2 billion each year for travel in the management and operation of Federal programs. Executive program managers have the primary responsibility for assuring the most effective use of their program budgets, including the nature and extent of travel. The Office of Management and Budget and the General Services Administration should revise their guidelines to focus more specifically on each purpose of travel; require agencies to revise their reporting systems and internal review and audit approaches to follow the new guidance; and after implementing the revised guidelines and the reporting and review systems, assess results.
A Report to the Committee on Government Operations, House of Representatives by the Comptroller General of the United States.

General Accounting Office Mar. 1977, 27 pp

ACKNOWLEDGMENT: General Accounting Office
ORDER FROM: General Accounting Office, 441 G Street, NW, Washington, D.C., 20548

21 176726
CHARTER DATA BANK
The Civil Aeronautics Board has placed a copy of its historical file of civil aircraft charter statistics at the National Archives and Records Service (NARS) for public use. The CAB "Charter Data" file contains the following reported data elements for each distinguishable charter group flight leg: carrier, flight number, aircraft type, day of departure, type of charter, type of flight leg, points of emplanement and deplanement, number of seats contracted for, number of passengers enplaned, and carrier revenue for the charter group flight leg. Distances have been added in CAB processing, and available seat-miles, available ton-miles, revenue passenger-miles, and revenue ton-miles have been computed and entered into the file.
Direct requests to Mr. Charles Gellert, Archivist at GSA.

Civil Aeronautics Board No Date, n.p.

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: General Services Administration, Machine-Readable Archives Division (NNR), Washington, D.C., 20408

21 176727
COMMUTER AIR CARRIER STATISTICS FOR YEAR 1977
Commuter air carriers performed 1,685,367 departures in scheduled passenger and cargo service during 1977 according to a Civil Aeronautics Board report. Revenue passenger-miles increased 16.1 percent and revenue ton-miles increased 20.7 percent in calendar year 1977 over the previous year. The greater increase in revenue ton-miles compared with revenue passenger-miles is attributed to a 26 percent growth in cargo revenue to miles for 1977. Of 1,515,571 departures scheduled to be flown in passenger service in 1977, 1,343,763 or 88.7 percent, were completed. Although the commuter carriers performed 18 percent more scheduled departures than did the local service carriers during the year, the commuter carriers performed only one-eighth of the total of revenue ton-miles that the local service carriers performed.

Civil Aeronautics Board No Date, n.p.

ACKNOWLEDGMENT: Civil Aeronautics Board
ORDER FROM: Civil Aeronautics Board, 1825 Connecticut Avenue, NW, Room 613, Washington, D.C., 20428

21 176728
INTERNATIONAL TOURISM: 1975, MORE VISITORS TO USA THAN EVER BEFORE
No Abstract.

Department of Commerce 1975, 8 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO
ORDER FROM: GPO

C47.2:T64/10/975

21 177015
NATIONAL TOURISM POLICY STUDY ASCERTAINMENT PHASE: REPORT ON THE ASCERTAINED NEEDS OF THE STATE AND LOCAL GOVERNMENT AND PRIVATE SECTORS OF THE TOURISM AND TRAVEL INDUSTRY
No Abstract.
Prepared for the Committee on Commerce, Science and Transportation, 95th U.S. Congress, First Session.

Little (Arthur D), Incorporated 1977, 217 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publicatons, GPO
ORDER FROM: GPO

Y4.C73/7:T64

21 178117
VALUE OF BUSINESS TRAVEL TIME
This study is concerned with identifying and measuring the employee, employer and community time costs associated with business air journeys. The value of business travel time savings is defined in terms of a composite employee-employer-community value using the argument that savings in total resources resultant from savings in travel time is related to the opportunity cost of travel by an employee to the employer, the disutility cost of travel to the employee, and the net benefit directly to the community from such time savings. The sections in this book outline the theoretical arguments and conceptual approaches previously used to value business travel time, and then suggest an alternative procedure to arrive at improved measures of the value of business travel time. The empirical framework is discussed in the context of the particular issues for investigation, the need for data collection, the selection of empirical design including sample design, questionnaire design and contents. The conduct of the study is outlined together with the results of the pilot study. The remaining sections detail the results of the empirical research and provide concluding comments on the major-findings.

Heusher, DA (Morgan (R Travers) and Partners)
Pergamon Press 1977, 159 pp, Figs., Tabs., Apps.

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

21 180436
COMPETITIVE RESTRAINTS ON AIR TRAVEL: GROUND MODES AND TELECOMMUNICATIONS
The history of air transportation is reviewed by reference to a series of diagrams illustrating the marked increase in air travel over the last 40 years because of the large increases in speed and comfort obtained with ever decreasing costs. Information derived from a national travel survey in the United States is used to discuss US intercity modal split, and it is suggested that a detailed evaluation of the competitive characteristics by transportation modes- automobile, air, bus and rail must accept that access and egress times and costs vary in every community. In this paper the author compares modes on the basis of block times versus range, ignoring the access and egress time and costs, indicating that errors may thus arise for short range, but become of much less importance for long range. Ground modes are assumed to require 15 per cent longer actual distances than air transport to cover the same point to point distance and all cost data are based on or corrected to U.S. 1974 airline costs. Future transport aircraft development is reviewed, and comparisons drawn with improved passenger trains, track levitated systems, buses and automobiles. Information on speed and fares indicates that as ranges increase beyond 200 to 300 statute miles that the air mode becomes increasingly preferable both in speed and cost. However, it is considered that the private automobile will continue to be the most important travel mode at short ranges, and a significant mode even at ranges up to 2000 miles. /TRRL/

Shevell, RS (Stanford University) *Aeronautical Journal* Vol. 82 No. 806, Feb. 1978, pp 75-84, 16 Fig., 1 Tab., 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233674)
ORDER FROM: ESL

21 182480
TRAVEL MARKETING. THE YEARBOOK OF TRAVEL FACTS, FIGURES AND TRENDS

This report discusses several general topics related to travel and tourism. A section on the market describes travel market perspectives, domestic and international traffic, and passport facts. Various modes of transportation including domestic and international airlines, charter flights, buses, railroads and cruise ships are discussed. A discussion of hotel, motel, and resort accommodations is included as well as a brief market overview of Portugal and the Caribbean. Travel services and traveler characteristics are described. A section on travel advertising discusses expenditures by travel segments, by major measured media and by leading advertisers. U.S. and world economies, exchange rates, inflation, population and taxes are discussed. A glossary of travel organizations and abbreviations is included as well as an index of tables, charts and graphs.

Travel Marketing 1978, 96 pp, Figs., Tabs.

ACKNOWLEDGMENT: Travel Marketing
ORDER FROM: Travel Marketing, 31 Wallacks Lane, Stamford, Connecticut, 06902

SOURCE INDEX

This index serves not only as the reference for the publications and the corporate affiliations of authors of documents appearing in this bibliography but also as the source for addresses of organizations that do not appear on page iii. In general, if no address is listed after the name of an organization, the entry involves an author affiliation rather than a publication. Consequently, there are multiple listings for many organizations, and all the document numbers should be checked. Some organizations have more than one office, and again there will be more than one listing of document numbers of possible interest.

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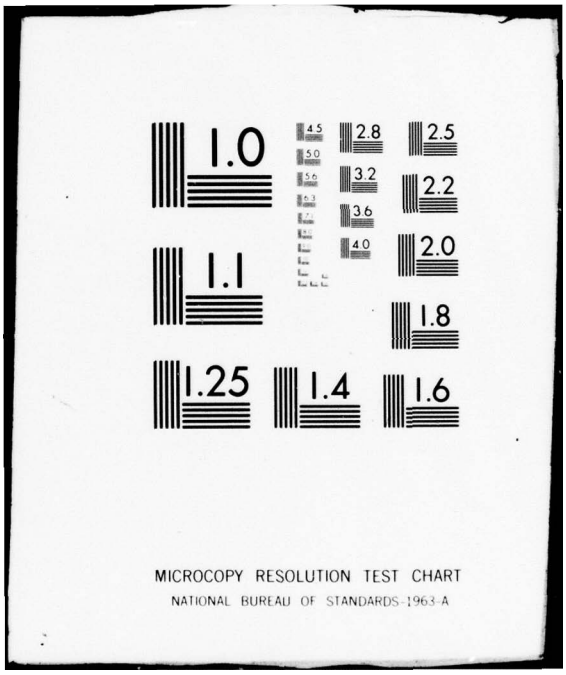
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